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Monitoring Report On The Glanbrook Landfill Site

1985

1985 ANNUAL OPERATIONAL MONITORING REPORT GLANBROOK LANDFILL SITE FOR THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

PROJECT 86-35

SEPTEMBER 1986

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September 18, 1986

The Regional Municipality of Hamilton-Wentworth,
Department of Engineering,
71 Main Street West,
Hamilton, Ontario.
L8N 3T4

Attention: Mr. Palombella:

Dear Sirs:

Re: Annual Monitoring Report (1985),
Glanbrook Landfill Site,
GLAL 86-35

We are pleased to provide the 1985 Annual Operational Monitoring Report for the Glanbrook Landfill Site for your reference and consideration.

The report contains the records of the water and gas monitoring results up to and including 1985. These data were transcribed onto computer disk and the tables and graphs were produced using Lotus software. As well, the report provides a discussion of these results along with our conclusions and recommendations. Details of the 1986-1987 suggested monitoring program are provided.

In summary, the monitoring results do not indicate an effect of the landfill site operation on ground and surface water quality. However, there is a concern regarding techniques and protocols that are being used in the acquisition of the data. Measures will be required during future monitoring to ensure the quality and integrity of the results. Details are provided in the report.

We will be pleased to discuss this report with you at your convenience.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

P.K. Lee, P.Eng.,
Consulting Engineering Geologist,
Vice-President.

DEJ:jmh

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1.0 INTRODUCTION

The Glanbrook Landfill Site commenced operations in 1981 under the conditions of the Provisional Certificate of Approval. One of the conditions on the certificate was the provision of a water quality and gas monitoring program. The initial program was prepared in 1980 by Gartner Lee Associates Limited. Each year the monitoring results have been reviewed, the program revised, and a report prepared.

Gartner Lee Associates Limited was retained by the Region to complete the 1985 annual operational monitoring report in accordance with our proposal dated January 24, 1986. The Region's purchase order number 58633 pertains to this project.

The principal elements of the study include the following tasks:

- a synthesis and analysis of the water and gas monitoring results obtained since 1980 through to 1985 inclusive.

- an assessment of the landfill operation on the ground and surface water setting based on the monitoring data.

- the preparation of recommendations for a monitoring program for 1986 and 1987 until the 1986 report is accepted.

- the documentation of the study findings along with conclusions and recommendations.

This study was carried out in the office, and was based on data supplied by the Region. We were not responsible for the collection of the monitoring data nor was any site visit carried out as part of this study.

Our synthesis approach involved the use of the computer. The monitoring results were transcribed onto disks using the Lotus 123 software program. This program allows the addition of future data without any significant modifications. The results are tabulated in the Appendix. Graphs of time vs concentration relationships and hydrographs were computer generated using the program.

With the use of the tables and graphs, an assessment of the effect of the landfill on the water setting was made. The new monitoring program was formulated and the report prepared.

2.0 MONITORING RESULTS

The following sections of the report provide a summation of the detailed water level, water chemistry and gas readings which are contained in the appendix. The data are grouped according to a) ground water levels, b) ground water chemistry, c) leachate, d) surface water and e) combustible gas. Details follow.

2.1 GROUND WATER LEVELS

The ground water flow patterns at this landfill site were established in the original hydrogeological study. In summary, there are two distinct components of the ground water systems. The one system is associated with the bedrock. Ground water flow patterns in the bedrock system are typically in an easterly direction towards the Welland River. The other system is associated with the clay soil overburden. In this system, the shallow ground water flow patterns are typically a subtle reflection of the contours of the surface topography. Thus there is a component of ground water flow easterly towards the Welland River and a flow component south and westerly towards Buckhorn Creek. A ground water flow divide passes through the central portion of the landfill site property.

Ground water elevations have been measured at selected locations as part of the monitoring program since 1980. The monitor locations are shown on the Site Plan, Figure 1, and the water elevations are contained in Table 1. Hydrographs were prepared for each monitor, and the results are contained in Figures 2 to 12 in the Appendix A.

In general, the water level patterns have been fairly consistent since the initiation of monitoring at the monitoring stations. Thus the lateral ground water flow patterns are similar to those originally established. The ground water data also show vertically downward hydraulic gradients had hence downward gound water movement is inferred at most monitor locations. Exceptions are Boreholes 12 and 17 where gradients are upward reflecting discharge. and boreholes 5 and 22 which show some variation in the direction of hydraulic gradients.

Water table fluctuations are typically within several metres except in Boreholes 5, 13 and 25 which show more scatter. There are no apparent patterns of increasing or decreasing water levels with time base on the monitoring data.

2.2 GROUND WATER CHEMISTRY

Background ground water quality was established at selected monitoring stations prior to the initiation of landfilling. These results are noted as background on Table 3 in Appendix C. The data indicate that the background water quality, in both the bedrock and the overburden ground water systems, is naturally quite mineralized and of poor quality. It is generally very hard with high concentrations of chloride and sulphate. The major anions tested, sodium, potassium, calcium and magnesium, are present in moderate concentrations. Heavy metals are generally not detected or are below the detection limit except for iron, manganese and possibly lead. There is a tendency towards higher concentrations of chemical parameters in the ground water in the bedrock compared to the soil.

The routine ground water monitoring program includes a network of stations which a) provide background ground water quality data both in the bedrock and the soil systems and b) provide water quality data within the pathway of possible contaminant movement.

The background monitoring stations at this stage of the landfill development are the shallow monitors in boreholes 1a, 5, 14, and 17 and the deep monitors in boreholes 12, 13, 22, 24, 25, and 26. The monitor results tend to exhibit considerable variation both from the background concentrations and over the monitoring period from 1980 to 1985. A brief description of the chemistry patterns at each background monitoring station follows.

- Monitor 1A-I: This monitor is screened in the bedrock. As shown in Figure 15 and 16. Conductivity and chloride levels decreased in October 1983. There was a subsequent increase in levels in 1984. In 1985 concentrations of conductivity, chloride, hardness, alkalinity, potassium, calcium and magnesium decreased significantly. Since 1984 there has been a trend towards increased nitrogen levels. See Table 3, Sheet 1.

- Monitor 1A-II: This monitor is screened in the soil. The chemistry trends are similar to those described for 1A-I, except that nitrogen levels are more variable. See Table 3, Sheet 2.

- Monitor 1A-III: This monitor is also screened in the soil. Several sampling periods are not available as the monitor was dry. However, chemical concentrations

are currently well below background levels except for the nitrogens which vary. See Table 3, Sheet 3.

- Monitor 5-I: This monitor is screened in the bedrock. As shown in Figures 17 and 18 the conductivity and the concentration of chlorides are well below background levels in 1982, 1983 and 1984. However, in 1985 the levels increased, but are still below background. A similar pattern occurs for hardness, alkalinity, sulphate, sodium, calcium and magnesium. The levels of the nitrogens and iron are more variable and lack the trend of the other parameters. See Table 3, Sheet 4.

- Monitor 5-II: This monitor is screened in the soil. There are only two sets of data available. There are significant differences in the data except for the nitrogens and COD. See Table 3, Sheet 5.

- Monitor 5-III: This monitor is also screened in the soil. Levels were reasonably consistent until 1982 when most parameters showed a significant increase in concentration. Except for the nitrogens, COD and iron, levels declined in 1983 and then increased again in 1984. There are no results for 1985. See Table 3, Sheet 6.

- Monitor 12-I: This monitor is screened in the bedrock. As shown in Figure 19 and 20, conductivity and chloride levels decreased from background through to 1982 and 1983. At this time levels increased but are still below background concentrations. A similar pattern occurs for hardness and sulphate except that hardness decreased again in 1985. Kjeldahl levels have increased signifcantly above background.

Nitrate and COD show more variation in levels. See Table 3, Sheet 7.

- Monitor 13-I: This monitor is screened in the bedrock. As shown on Figures 21 and 22, conductivity and chloride levels show considerable variation generally above background. Most of the other parameters show considerable variation in concentration. See Table 3, Sheet 10.

- Monitor 14-I: This monitor is screened in the bedrock. As shown on Figures 23 and 24, conductivity and chloride levels show considerable variation generally above background concentrations. Similar patterns occur for most of the other parameters. See Table 3, Sheet 4.

- Monitor 14-II: This monitor is screened in the soil. As for Monitor 14-I, the concentration of most parameters show considerable variation except for sulphate and potassium. The levels of these parameters have consistently decreased over the monitoring period. See Table 3, Sheet 15.

- Monitor 14-III: This monitor is also screened in the soil. As shown on Figure 23, the conductivity levels have declined significantly over the monitoring period. Chloride levels as shown on Figure 24 have also declined. In May, June and July 1982, chloride levels were anomalously low. Other parameters show trends to lower concentrations except for kjeldahl, nitrate and potassium for which levels have increased. In all cases the levels vary considerably. See Table 3, Sheet 16.

- Monitor 17-I: This monitor is screened in soil. As shown on Figures 25 and 26, there is a trend to lower concentrations of conductivity and chloride. This pattern is generally evident for the other parameters except for the nitrogens in which levels have tended to increase. See Table 3, Sheet 17.

- Monitor 17-II: This monitor is also screened in the soil. As shown on Figure 25, the conductivity levels have decreased over the monitoring period except in October 1984 when there was a slight increase from the 1983 result. Chloride levels as shown on Figure 26 decreased to October 1983 but have increased since that time. A pattern similar to chloride is also noted for sulphate, COD and iron. Phenol levels show a steady decline. Other parameters tested show more variation in the results. See Table 3, Sheet 18.

- Monitor 17-III: This monitor is also screened in the soil. The chemistry results show considerable variation at levels typically below background concentrations. The exceptions are the nitrogens and COD which are at levels mainly above background concentrations. See Table 3, Sheet 19.

- Borehole 22-I: This monitor is screened in the soil. As shown in Figures 27 and 28, there was a wide variation in conductivity and chloride levels through to 1982. At that time, levels decreased significantly. No water samples have been collected since 1984. A similar pattern is noted for sulphate. Results for other parameters tend to show more variation. See Table 3, Sheet 20.

- Borehole 24-I: This monitor is screened in bedrock. As shown on Figures 29 and 30, the conductivity and chloride levels have fluctuated around the background concentrations. In 1985 the conductivity level dropped to its lowest value since monitoring commenced. A similar pattern of variability occurs for the other parameters. See Table 3, Sheet 22.

- Borehole 25-I: This monitor is screened in soil. As shown in Figure 31, the conductivity levels have fluctuated typically below the background concentrations. Chloride levels as shown on Figure 32 have fluctuated around the background concentrations. For both parameters the 1985 levels were the lowest recorded. The levels of the other parameters tested show considerable variation over the monitoring period. See Table 3, Sheet 25.

- Monitor 26-I: This monitor is screened in the soil. Results which are available since 1983 indicate some variation. All parameters tested except phenols, magnesium and iron showed a decrease in concentration from 1984 to 1985. See Figures 33 and 34, and Table 3, Sheet 29 for results.

The down gradient monitoring stations at this stage of the landfill development are potentially within the pathway of possible contaminant movement. These are the shallow and intermediate depth monitors in boreholes 13, 22, 24, 25 and 26. As with the background monitoring stations, there is considerable variability in the test results for many individual monitoring station. A brief description of the chemistry patterns at each monitoring

station within the pathway follows. All these monitors are screened in the soil.

- Monitor 13-II: The test results for most parameters show considerable variability with no discernable trends towards either increased or decreased levels. See Figures 21 and 22, and Table 3, Sheet 11 for results.

- Monitor 13-III: The results which are available since 1984 again indicate some variation. Parameters such as conductivity, chloride, hardness, sulphate, kjeldahl, ammonia, sodium and calcium had decreased levels from October 1984 to October 1985. Concentrations increased over the same period for the other parameters. See Table 3, Sheet 12.

- Monitor 13-IV: As shown on Figure 21, the conductivity levels show some variation with possibly a trend towards lower levels. The chloride levels as shown on Figure 22 are more consistent than the conductivity. Some variation in the test results of the other parameters is also noted. See Table 3, Sheet 13.

- Monitor 22-II: As shown on Figures 27 and 28, there was a wide variation in conductivity and chloride levels through to mid to late 1982. At that time levels dereased significantly. No water samples have been collected since 1984. A similar pattern is noted for hardness and sulphate. Results for other parameters show wide variation. See Table 3, Sheet 21.

- Monitor 24-II: The conductivity and chloride levels as shown on Figures 29 and 30 have fluctuated generally

below background concentrations since the spring of 1981. In 1985 the conductivity level dropped to its lowest level since monitoring commenced. A pattern of variability occurs for the other parameters. See Table 3, Sheet 23.

- Monitor 24-III: The patterns for the test results are similar to Monitor 24-II. See Figures 29 and 30 and table 3, Sheet 24 for results.

- Monitor 25-II: As shown on Figure 31, the conductivity results vary widely. The chloride levels as shown on Figure 32 also vary widely but with a pronounced decrease since mid-1981. Other parameters also show a pattern of wide variability over the monitoring period. See Table 3, Sheet 26.

- Monitor 25-III: The conductivity results decreased significantly in the spring of 1981 and have remained at the lower levels since that time. See Figure 31. As shown on Figure 32, the chloride levels vary widely with no apparent trends. A similar pattern is noted for the other parameters tested. However, since April 1985 there has been a trend of increased levels for hardness, alkalinity, sulphate, sodium, potassium, calcium and magnesium. See Table 3, Sheet 27.

- Monitor 25-N: The test results where sufficient results are available show a wide variation with no consistent trends. See Table 3, Sheet 28.

- Monitor 26-II: As shown on Figures 33 and 34, the conduc-

tivity and chloride levels show considerable variation. As well, considerable variation is noted for the other parameters tested. See Table 3, Sheet 30.

- Monitor 26-III: Only two sets of data are available for the monitor and these were obtained in 1984.

2.3 LEACHATE LEVELS

There are seven manholes located around the periphery of cells 1 to 4 which provide access to the leachate conduit pipes. The perforated toe-drain collector pipe below the refuse is joined at the cell boundary to a solid polyethylene pipe. This solid pipe connects to the sanitary sewer main at specific manhole locations. The sanitary sewer is continuous even through the manholes. In each manhole there is a clean-out and a standpipe for sampling and measuring water levels. These water levels should reflect the level of the leachate in the refuse.

Leachate elevations in the standpipes are documented on Table 2. Hydrographs for the leachate elevations in Manholes 1 and 4 are shown on Figures 13 and 14 respectively. In summary, the leachate levels have varied to a maximum of 1.5 m since measurements commenced in 1981. These data suggest that there is no trend towards increased or decreased leachate mounding in the refuse. In Manholes 1 and 4 the leachate levels were lower in October 1985 than during 1981 when landfilling commenced. Leachate levels in October 1985 were within the range of ground water levels in the standpipes in Boreholes 13, 24 and 25.

2.4 LEACHATE QUALITY

Leachate quality data are listed in Table 4 for the standpipes in Manholes 1 to 7. Test results for conductivity, pH and

chloride are available on a regular basis for Manholes 1 and 4. Less data are available for the other stations. Conductivity and chloride trends are plotted for Manholes 1, 3 and 4 in Figures 35 and 36. Following is a summary of the test results.

- Manhole 1: The conductivity and chloride levels fluctuate widely over the monitoring period. In general, levels tended to increase until the spring of 1985. Through 1985 there was a marked decrease in levels. See Table 4, Sheet 1.

- Manhole 3: Both conductivity and chloride levels have fluctuated over the monitoring period. Conductivity tended to increase to October 1982. However in October 1983 the level declined to near the initial concentration. No increasing or decreasing trends were noted for the chloride. See Table 4, Sheet 3.

- Manhole 4: Again the conductivity and chloride levels fluctuate widely. The conductivity tended to increase until the spring of 1984 at which time the level decreased. In October 1985 the level had increased slightly, yet stayed well below the maximum recorded level. There are no apparent patterns towards increased or decreased levels for the chloride.

2.5 SURFACE WATER QUALITY

Surface water quality data for Buckhorn Creek are compiled in Table 5 for the period October 1982 to October 1985. Parameters include conductivity, pH, chloride, and dissolved oxygen. Conductivity and chloride values are plotted in

Figures 37 and 38 respectively. Station SW1 is located about 600 m upstream of the site boundary, Station SW2 is located adjacent to Cell #2 where Buckhorn Creek leaves the site, and Station SW3 is located downstream of the site. Following is a summary of the monitoring results.

- SW1: Conductivity levels have decreased over the monitoring period except for January 31, 1983. Chloride levels decreased to May 1984 and have been increasing since that time. A similar pattern is noted for the dissolved oxygen except that the level decreased significantly in October 1985.

- SW2: The patterns at this station reflect in general the patterns at the up-stream station SW1 with the exception of the dissolved oxygen. The dissolved oxygen levels vary with no trend towards an increase or decrease.

- SW3: The chemistry at SW3 shows more variation than at the two up-stream stations. Conductivity and chloride levels have decreased until the fall of 1984. In 1985 the levels showed an increase over the previously measured levels in 1984. The dissolved oxygen shows a reversed trend.

2.6 METHANE GAS

The results of methane gas testing in the five gas monitoring stations are presented on Table 6. Monitors GM1 and GM2 are located adjacent to cell 1; monitors GM3 and GM4 are adjacent to cell 2; and monitor GM5 is adjacent to cell 3.

A trace of methane gas, that is less than 1% was detected in monitors GM1 to GM4 in 1983 and 1984. No methane was detected in 1985 nor in GM5.

3.0 DISCUSSION

The monitoring results presented in the previous section are discussed in the following paragraphs.

The shallowest monitor at each borehole location is a standpipe which measures the water table. These monitors are installed through the surficial weathered zone of the silty clay soils. A potential exists for lateral ground water movement and some degree of migration in the weathered zone. Deeper monitors are located in relatively unweathered deposits. Measured hydraulic heads indicate the potential for vertical ground water flow. A major area of interest is leachate mounding within the landfilled cells and, due to this driving pressure head, the potential for leachate to migrate. Comparisons of leachate elevations with adjacent water table elevations indicate little if any mounding and show that leachate and adjacent water table elevations are similar (Figure 1). A slight southward gradient is indicated out of Cell #1 toward Buckhorn Creek, however this gradient appears to be similar to the natural water table gradient at this location (Boreholes #25, #24, and #13).

Ground water chemistry data are generally more variable than would be expected from monitors in fine-textured soils. In several instances, the concentrations of numerous parameters have declined from background concentrations which were established in 1980. Occasional data are clearly questionable with order of magnitude decreases from previous analytical results. The reasons for the general decline in concentrations in many of the monitors and for the variability is not known, however a review of sampling protocols may help to

resolve this situation, i.e. whether variations are truly representative of natural processes or are the result of technical variables.

The leachate chemistry data also show unexpectedly large variations from location to location and with time. As well, the leachate concentrations are significantly lower than would be anticipated from a domestic sanitary landfill. While the chemistry results are variable and in relatively low concentrations, it does appear that there is no leachate impact on the adjacent water table and deeper ground water monitors. It is reasoned that flow from the filled cells to the adjacent down gradient areas through the surficial weathered zone will be slow due to permeabilities and gradients. However, no impact is yet seen in this most likely pathway. A review of sampling methods and protocols would be useful in assessing the data base. In addition, it is recommended that two monitoring stations be established in the fill for purposes of confirming leachate levels and obtaining leachate samples for chemical analysis.

The chemical parameters analyzed in the leachate differ from those tested for in the ground water and the surface water. Comprehensive testing of the leachate would be useful to fully characterize the leachate and this information could be used to tailor the analyses of ground and surface water samples for monitoring points beyond the landfill cells.

Surface water analyses are performed for relatively few parameters and in view of the variability which characterizes these data, possible impacts might be difficult to detect. Additional parameters should be incorporated into the

monitoring program. Estimates of streamflow discharge to accompany the chemistry are required to assist in interpreting the effects of the landfill if any on surface water quality.

The effects of a contaminant source on a surface water body can be measured using both water quality analysis and aquatic biology surveys. In some situations aquatic biology will indicate a degradation in the environment before there is a significant change in surface water quality. Thus it is recommended that an aquatic biology study be incorporated into the monitoring program.

With regards to methane gas, the migration of combustible gas in this low permeability setting is not a problem at this time. However, monitoring should be continued as a precautionary measure.

4.0 MONITORING PROGRAM

The monitoring program established for this landfill site should be continued with the appropriate changes as outlined in this section. This program is essential to confirm the predictions of the hydrogeological study and to provide an early warning of any impending problems such that remedial measures can be initiated. In this regard it would appear that a better data base is required for characterization of the leachate so that the most appropriate parameters can be used for correlation with monitoring stations. Details of the program follow.

I GROUND WATER MONITORING STATIONS:

a) Borehole 1A - monitors I, II and III
b) Borehole 5 - monitors I, II and III
c) Borehole 12 - monitors I, II and III
d) Borehole 13 - monitors I, II, III and IV
e) Borehole 14 - monitors I, II and III
f) Borehole 17 - monitors I, II and III
g) Borehole 22 - monitors I and II
h) Borehole 24 - monitors I, II and III
i) Borehole 25 - monitors I, II, III and IV
j) Borehole 25 - monitors I, II and III

II LEACHATE STATIONS:

a) The standpipes in manholes 1 to 17
b) Two new monitoring stations; one in cell 1 and the other in cell 2. The exact locations should be determined in the field by experienced hydrogeologists.

III SURFACE WATER MONITORING STATIONS

a) SW1, SW2 and SW3 as previously located.

IV GAS MONITORING STATIONS:

a) GM1 to GM5.

V FREQUENCY:

Water samples should be collected and gas measurements taken

a) October 1986
b) April 1987
c) October 1987

If the test results show significant variation from the previous results, then the monitor should be re-sampled and the water samples analyzed. The process should be repeated until there is a consistency in the test results. An experienced geo-chemist should be consulted regarding this aspect.

VI PARAMETERS: ALL STATIONS

Conductivity	Sodium
pH	Potassium
Chloride	Calcium
Hardness	Magnesium
Alkalinity	Phosphorus
Sulphate	Cadmium
Kjeldahl Nitrogen	Chromium
Ammonia	Copper
Nitrate	Iron
Phenol	Lead
BOD	Manganese
COD	Nickel
DOC	Zinc
TOC	

In addition, dissolved oxygen should be measured at the three surface water monitoring stations.

VII STREAM FLOW:

It is recommended that a stream flow gauging station be established at SW3. Ideally a permanent continuous recorder should be considered. As an alternative a staff gauge to establish the flow characteristics is satisfactory. This work was recommended as part of the original water monitoring program for this landfill site. Reference GLAL report 80-29, dated May 1980. .

VIII AQUATIC BIOLOGY

An aquatic biology study is recommended as part of the monitoring program. The aquatic biology survey should consist of a qualitative assessment of the bottom invertebrate community and a visual assessment of the aquatic vegetation conditions. The survey should be conducted at each of the three monitoring stations in accordance with the schedule established in part V and to coincide with the water sampling and stream flow measurements.

As part of this study a walking survey of Buckhorn Creek should be carried out to identify the significant contributors to surface water in the main creek channel.

The aquatic biology study should be carried out by experienced personnel.

IX WATER LEVELS

Water level measurements should be taken prior to the development and sampling of the ground water and leachate

monitors identified in parts I and II. These data should be recorded including monitors which are dry.

X PROTOCOLS AND REPORTING

It is essential to the integrity of the chemical test results that an approved sampling protocol be employed. This protocol should include the proper and complete development of the monitor, use of sterilized equipment and where possible dedicated equipment, proper in situ treatment of samples such as filtering and preservatives, sample storage and sample delivery to the laboratory within specified times. It is recommended that the sampling program be carried out by a trained and experienced hydrogeologist. However, if Regional staff are used, the protocols should be confirmed in the field by either the Ministry of the Environment or a hydrogeologist.

The site should be inspected annually by a qualified hydrogeologist as part of the annual report.

In view of the timing and approval processes for the annual report, it is recommended that the program as outlined herein be carried out until such time as the 1986 report is prepared and approved.

5.0 CONCLUSIONS

Based on our review of the monitoring information for the period of record and particularly for 1985, we have drawn the following conclusions.

- No significant mounding of leachate in the filled cells appears to have taken place. Gradients from the landfill are southward and appear to be comparable to normal water table gradients in the area. Higher heads in the fills that could drive leachate outward from the cells are not present.

- Water level data in the boreholes indicate downward gradients and downward ground water movement by advection over most of the site which is consistent with previous analyses.

- Ground water quality data in the borehole monitors is variable, however no leachate impacts are apparent in standpipe monitors adjacent to the landfill where impacts would first be encountered if leachate migration were occurring. The degree of variability of the data is considered unusual in this slow response low permeability hydrogeologic setting.

- Leachate quality data based on fluid samples from the landfill manhole standpipes of the collection system are variable and have no definite trends. Current analyses based on limited parameters are not sufficient to fully characterize the leachate.

- Surface water quality data are variable. Based on the existing data base there is no apparent impact on surface water quality.

- Methane gas does not appear to be a problem at the present time.

- There are no design or operational changes that we would recommend from a hydrogeological viewpoint as a result of this study based on the available data.

6.0 RECOMMENDATIONS

We respectfully submit the following recommendations based on the study findings for your consideration.

- An up-grading of the chemistry data to ensure a consistency of the test results as a means of improving the interpretation of the effects of the landfill on ground and surface water resources. Suggestions are provided in Section 4.0 of this report.

- The implementation of the monitoring program as described in Section 4.0 of this report.

- This report should be submitted to the Ministry of the Environment for their review.

Prepared by:

K. J. Goff, M.Sc.,
Senior Hydrogeologist.

Under the Supervision of

D. E. Jagger, P.Eng.,
Consulting Engineer,
Associate.

APPENDICES

APPENDIX A

GROUND WATER ELEVATIONS

GLANBROOK LANDFILL SITE
PROJECT 86-35
GROUND WATER LEVEL DATA

TABLE 1 SHEET 2

DATE	BOREHOLE 5		
	MONITOR I	MONITOR II	MONITOR III
	TYPE P	TYPE P	TYPE S
	DEPTH (m) 11.70	DEPTH (m) 8.80	DEPTH (m) 7.00
	GROUND ELEV. 189.88 (m a.s.l.)	GROUND ELEV. 189.88 (m a.s.l.)	GROUND ELEV. 189.88 (m a.s.l.)
	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80			
28-Nov-80			
23-Dec-80			
05-Feb-81			
02-Mar-81			
25-Mar-81			
28-Apr-81			
20-May-81			
25-Jun-81			
29-Jul-81			
26-Aug-81			
29-Sep-81			
15-Oct-81	186.70	189.60	188.90
25-Mar-82			
22-Oct-82	184.70	185.90	188.30
28-Jan-83			
26-Apr-83			
28-Jul-83			
31-Oct-83	186.71	186.50	188.44
24-Apr-84			
17-Jul-84			
15-Oct-84	185.69	188.65	188.17
25-Feb-85			
10-Apr-85			
17-Jul-85			
29-Oct-85	185.69	185.69	DRY

GLANBROOK LANDFILL SITE
PROJECT 86-35
GROUND WATER LEVEL DATA

TABLE 1 SHEET 3

DATE	BOREHOLE 12		
	MONITOR P	MONITOR II	MONITOR III
	TYPE P	TYPE P	TYPE P
	DEPTH (m) 14.30	DEPTH (m) 10.80	DEPTH (m) 6.10
	GROUND ELEV. 191.47	GROUND ELEV. 191.50	GROUND ELEV. 191.50
	(m a.s.l.)	(m a.s.l.)	(m a.s.l.)
	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80			
28-Nov-80			
23-Dec-80			
05-Feb-81			
02-Mar-81			
25-Mar-81			
28-Apr-81			
20-May-81			
25-Jun-81			
29-Jul-81			
26-Aug-81			
29-Sep-81			
15-Oct-81	187.10	187.30	187.80
25-Mar-82			
22-Oct-82	187.00	186.70	185.80
28-Jan-83			
26-Apr-83			
28-Jul-83			
31-Oct-83	187.06	186.73	185.74
24-Apr-84			
17-Jul-84			
15-Oct-84	187.03	186.75	185.77 (DRY)
25-Feb-85			
10-Apr-85			
17-Jul-85			
29-Oct-85	186.91	186.34	DRY

GLANBROOK LANDFILL SITE
PROJECT 86-35
GROUND WATER LEVEL DATA

TABLE 1 SHEET 5

	BOREHOLE 14		
DATE	MONITOR I TYPE P DEPTH (m) 19.70 GROUND ELEV. 194.11 (m a.s.l.)	MONITOR II TYPE P DEPTH (m) 15.20 GROUND ELEV. 194.11 (m a.s.l.)	MONITOR III TYPE S DEPTH (m) 9.10 GROUND ELEV. 194.30 (m a.s.l.)
	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80	185.30	187.50	190.50
28-Nov-80	185.80	187.80	190.50
23-Dec-80	185.60	187.80	190.70
05-Feb-81	185.60	187.70	189.60
02-Mar-81	186.00	188.00	191.00
25-Mar-81	185.90	187.90	190.90
28-Apr-81	185.80	187.80	191.20
20-May-81	185.80	187.80	191.20
25-Jun-81	186.20	188.00	191.30
29-Jul-81	185.80	188.00	190.90
26-Aug-81	185.80	188.60	191.10
29-Sep-81	185.70	188.00	191.30
15-Oct-81	185.90	187.80	191.40
25-Mar-82	185.90	188.20	191.60
22-Oct-82	185.50	188.00	190.50
28-Jan-83			
26-Apr-83			
28-Jul-83			
31-Oct-83	185.65	188.11	191.03
24-Apr-84			
17-Jul-84			
15-Oct-84	185.70	188.14	191.15
25-Feb-85			
10-Apr-85			
17-Jul-85			
29-Oct-85	185.60	187.70	190.53

GLANBROOK LANDFILL SITE
PROJECT 86-35
GROUND WATER LEVEL DATA

TABLE 1 SHEET 6

DATE	BOREHOLE 17		
	MONITOR I	MONITOR II	MONITOR III
	TYPE P	TYPE P	TYPE S
	DEPTH (m) 9.60	DEPTH (m) 8.70	DEPTH (m) 5.30
	GROUND ELEV. 188.60 (m a.s.l.)	GROUND ELEV. 188.60 (m a.s.l.)	GROUND ELEV. 188.60 (m a.s.l.)
	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80			
28-Nov-80			
23-Dec-80			
05-Feb-81			
02-Mar-81			
25-Mar-81			
28-Apr-81			
20-May-81			
25-Jun-81			
29-Jul-81			
26-Aug-81			
29-Sep-81			
15-Oct-81	187.20	187.30	187.60
25-Mar-82			
22-Oct-82	187.10	187.10	185.80
28-Jan-83			
26-Apr-83			
28-Jul-83			
31-Oct-83	187.16	187.15	186.92
24-Apr-84			
17-Jul-84			
15-Oct-84	187.17	187.27	186.83
25-Feb-85			
10-Apr-85			
17-Jul-85			
29-Oct-85	187.10	187.09	186.26

TABLE 1 SHEET 7

GLANBROOK LANDFILL SITE
PROJECT 86-35
GROUND WATER LEVEL DATA

DATE	BOREHOLE 22	
	MONITOR I	MONITOR II
	TYPE P	TYPE S
	DEPTH (m) 10.70	DEPTH (m) 5.80
	GROUND ELEV. 190.75 (m a.s.l.)	GROUND ELEV. 190.75 (m a.s.l.)
	GROUND WATER ELEVATIONS (m a.s.l.)	
27-Oct-80	185.40	188.20
28-Nov-80	187.30	188.00
23-Dec-80		
05-Feb-81	187.30	188.10
02-Mar-81	187.40	188.70
25-Mar-81	187.20	188.70
28-Apr-81	187.20	189.00
20-May-81	187.20	189.00
25-Jun-81	187.40	189.00
29-Jul-81	187.40	188.90
26-Aug-81	187.20	188.70
29-Sep-81	187.30	189.00
15-Oct-81	187.30	189.00
25-Mar-82	187.40	189.50
22-Oct-82	187.10	189.00
28-Jan-83		187.26
26-Apr-83	189.58	187.69
28-Jul-83	190.45	188.99
31-Oct-83	187.33	188.90
24-Apr-84		
17-Jul-84		
15-Oct-84		
25-Feb-85		
10-Apr-85		
17-Jul-85		
29-Oct-85	NA	NA

TABLE 1 SHEET 8

GLANBROOK LANDFILL SITE
PROJECT 86-35
GROUND WATER LEVEL DATA

	BOREHOLE 24		
DATE	MONITOR I TYPE P DEPTH (m) 12.20 GROUND ELEV. 189.36 (m a.s.l.)	MONITOR II TYPE P DEPTH (m) 7.00 GROUND ELEV. 189.37 (m a.s.l.)	MONITOR III TYPE S DEPTH (m) 3.70 GROUND ELEV. 189.36 (m a.s.l.)
	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80	185.00	187.60	187.60
28-Nov-80	186.90	187.70	187.70
23-Dec-80	186.90	187.50	187.50
05-Feb-81	186.80	187.50	187.50
02-Mar-81	187.00	188.00	188.00
25-Mar-81	186.90	187.70	187.70
28-Apr-81	186.90	187.80	187.80
20-May-81	186.90	187.70	187.70
25-Jun-81	186.80	187.80	187.80
29-Jul-81	186.90	188.00	188.00
26-Aug-81	186.90	187.40	187.50
29-Sep-81	186.90	187.70	187.70
15-Oct-81	186.80	187.60	187.60
25-Mar-82	187.00	188.00	188.00
22-Oct-82	186.70	187.50	187.50
28-Jan-83	186.83	187.63	187.63
26-Apr-83	186.98	187.73	187.75
28-Jul-83	186.73	187.09	187.08
31-Oct-83	186.78	187.79	187.79
24-Apr-84	186.93	187.83	187.82
17-Jul-84	186.83	187.38	187.38
15-Oct-84	186.87	187.49	187.50
25-Feb-85	186.90	187.52	187.63
10-Apr-85	186.99	187.86	187.86
17-Jul-85			186.77
29-Oct-85	186.71	187.50	187.50

TABLE 1 SHEET 9

GLANBROOK LANDFILL SITE
PROJECT 86-35
GROUND WATER LEVEL DATA

DATE	BOREHOLE 25		
	MONITOR I	MONITOR II	MONITOR III
	TYPE P	TYPE P	TYPE S
	DEPTH (m) 15.20	DEPTH (m) 7.30	DEPTH (m) 4.30
	GROUND ELEV. 193.17 (m a.s.l.)	GROUND ELEV. 193.17 (m a.s.l.)	GROUND ELEV. 193.17 (m a.s.l.)
	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80	185.10	188.50	189.70
28-Nov-80	187.00	188.60	189.60
23-Dec-80	186.90	188.70	190.00
05-Feb-81	186.80	188.70	189.70
02-Mar-81	187.00	189.20	
25-Mar-81	186.80	189.10	191.30
28-Apr-81	186.90	189.30	192.20
20-May-81	186.90	189.40	192.30
25-Jun-81	187.00	189.40	191.70
29-Jul-81	186.90	189.40	191.70
26-Aug-81	186.90	189.40	190.70
29-Sep-81	187.00	189.50	191.60
15-Oct-81	186.90	189.50	191.80
25-Mar-82	187.10	189.90	192.20
22-Oct-82	186.80	189.50	190.50
28-Jan-83	186.82	190.91	192.03
26-Apr-83	187.00	190.03	192.22
28-Jul-83	186.81	189.75	191.07
31-Oct-83	186.89	188.30	191.37
24-Apr-84	186.97	189.93	191.84
17-Jul-84	186.91	189.64	190.46
15-Oct-84	186.92	189.37	189.81
25-Feb-85	186.96	189.96	189.87
10-Apr-85	187.05	190.50	192.05
17-Jul-85			189.09
29-Oct-85	186.72	189.44	189.52

GLANBROOK LANDFILL SITE
PROJECT 86-35
GROUND WATER LEVEL DATA

TABLE 1 SHEET 10

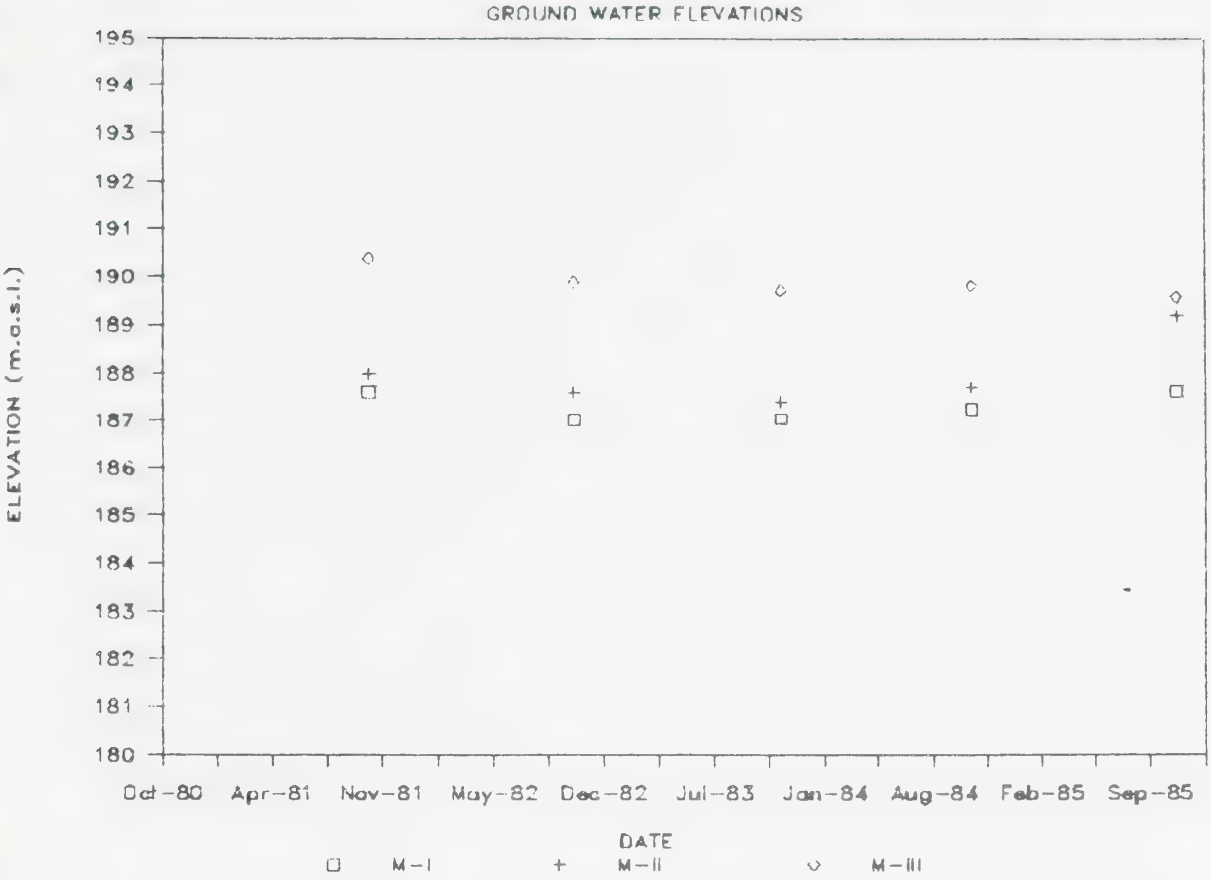
DATE	BOREHOLE 25a
	MONITOR I
	TYPE S
	DEPTH (m) 7.30
	GROUND ELEV. 193.11
	(m a.s.l.)
	GROUND WATER ELEVATIONS (m a.s.l.)
27-Oct-80	188.40
28-Nov-80	188.60
23-Dec-80	188.80
05-Feb-81	188.70
02-Mar-81	188.90
25-Mar-81	189.20
28-Apr-81	189.30
20-May-81	189.50
25-Jun-81	189.50
29-Jul-81	189.50
26-Aug-81	189.40
29-Sep-81	188.00
15-Oct-81	
25-Mar-82	190.00
22-Oct-82	189.50
28-Jan-83	189.88
26-Apr-83	190.30
28-Jul-83	189.82
31-Oct-83	188.27
24-Apr-84	189.75
17-Jul-84	189.58
15-Oct-84	189.32
25-Feb-85	DESTROYED
10-Apr-85	
17-Jul-85	
29-Oct-85	

GLANBROOK LANDFILL SITE
PROJECT 86-35
GROUND WATER LEVEL DATA

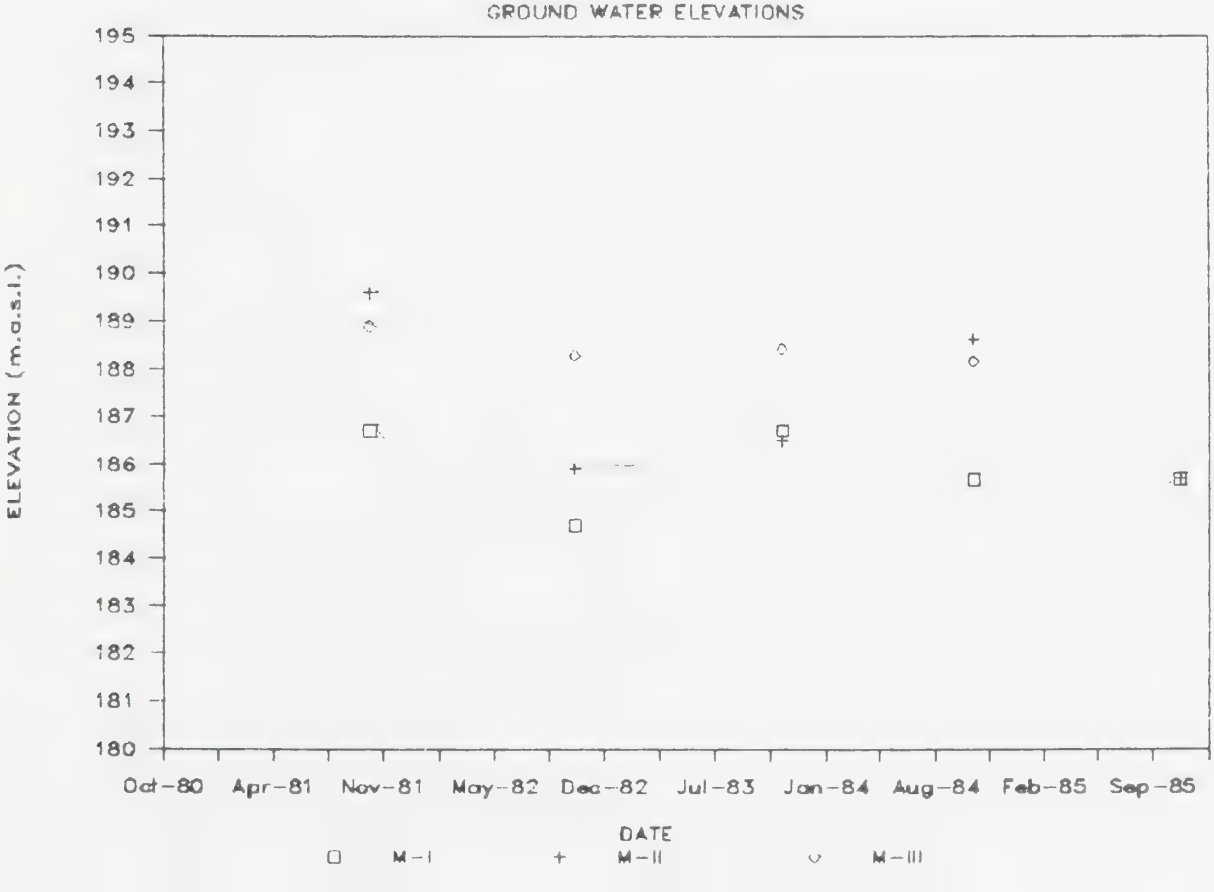
TABLE 1 SHEET 11

DATE	BOREHOLE 26		
	MONITOR I	MONITOR II	MONITOR III
	TYPE P	TYPE P	TYPE P
	DEPTH (m) 11.58	DEPTH (m) 7.62	DEPTH (m) 3.05
	GROUND ELEV. 190.85 (m a.s.l.)	GROUND ELEV. 190.85 (m a.s.l.)	GROUND ELEV. 190.85 (m a.s.l.)
	GROUND WATER ELEVATIONS (m a.s.l.)		
27-Oct-80			
28-Nov-80			
23-Dec-80			
05-Feb-81			
02-Mar-81			
25-Mar-81			
28-Apr-81			
20-May-81			
25-Jun-81			
29-Jul-81			
26-Aug-81			
29-Sep-81			
15-Oct-81			
25-Mar-82			
22-Oct-82			
28-Jan-83			
26-Apr-83			
28-Jul-83			
31-Oct-83			
~~24-Apr-84~~			
17-Jul-84			
15-Oct-84			
31-Jan-84	186.60	186.47	DRY
24-Apr-84	187.24	187.38	188.70
17-Jul-84	186.97	187.08	188.40
15-Oct-84	186.71	186.71	DRY
25-Feb-85	189.94	187.11	DRY
10-Apr-85	187.10	187.20	DRY
17-Jul-85		187.36	
29-Oct-85	186.55	186.17	DRY

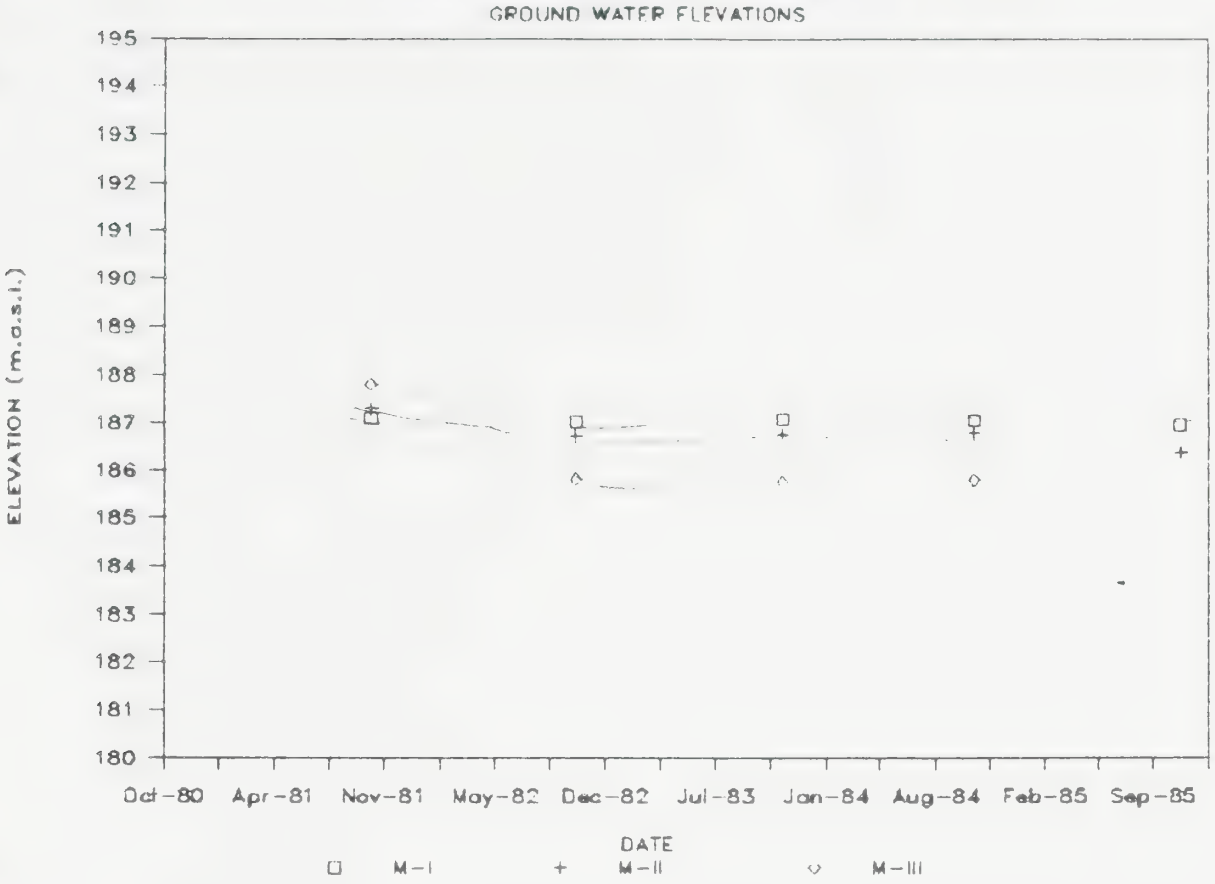
BOREHOLE 1A FIGURE 2



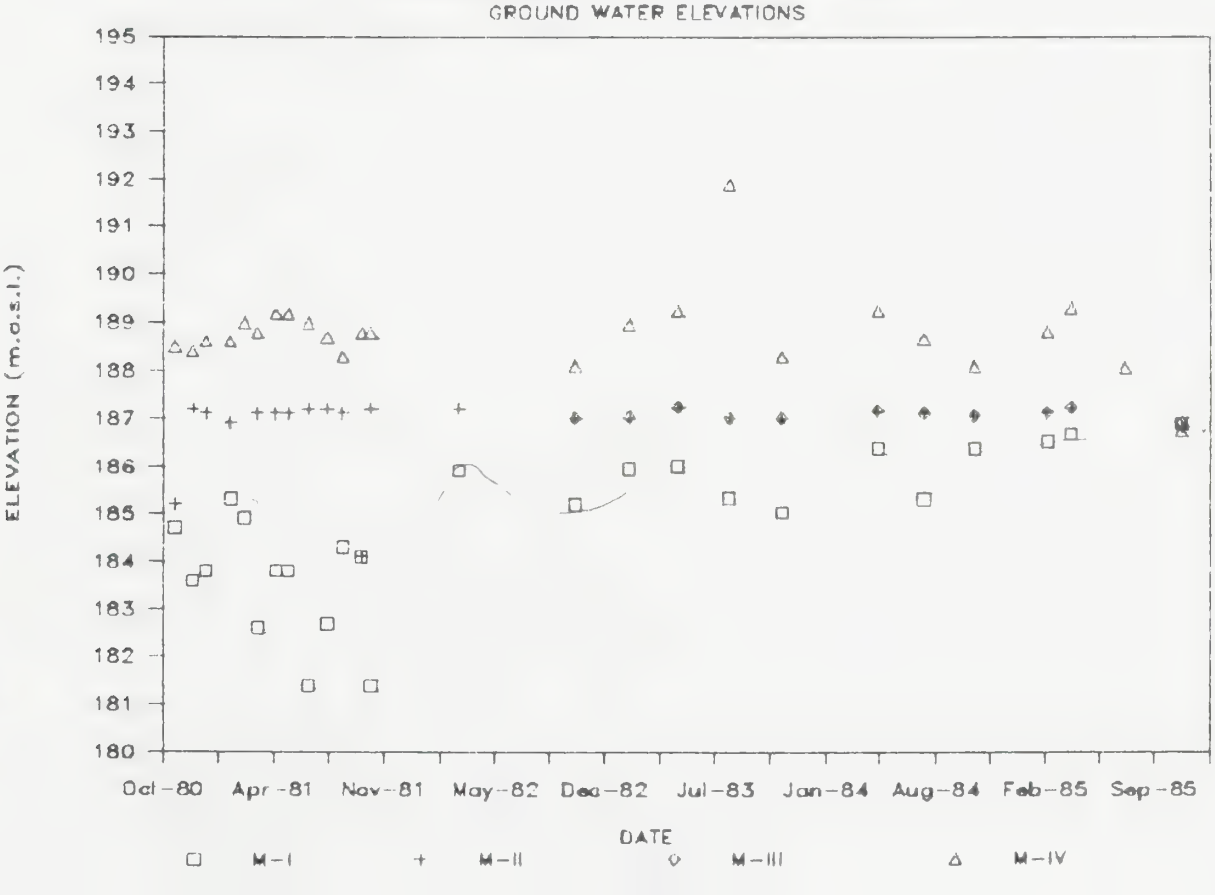
BOREHOLE 5 FIGURE 3



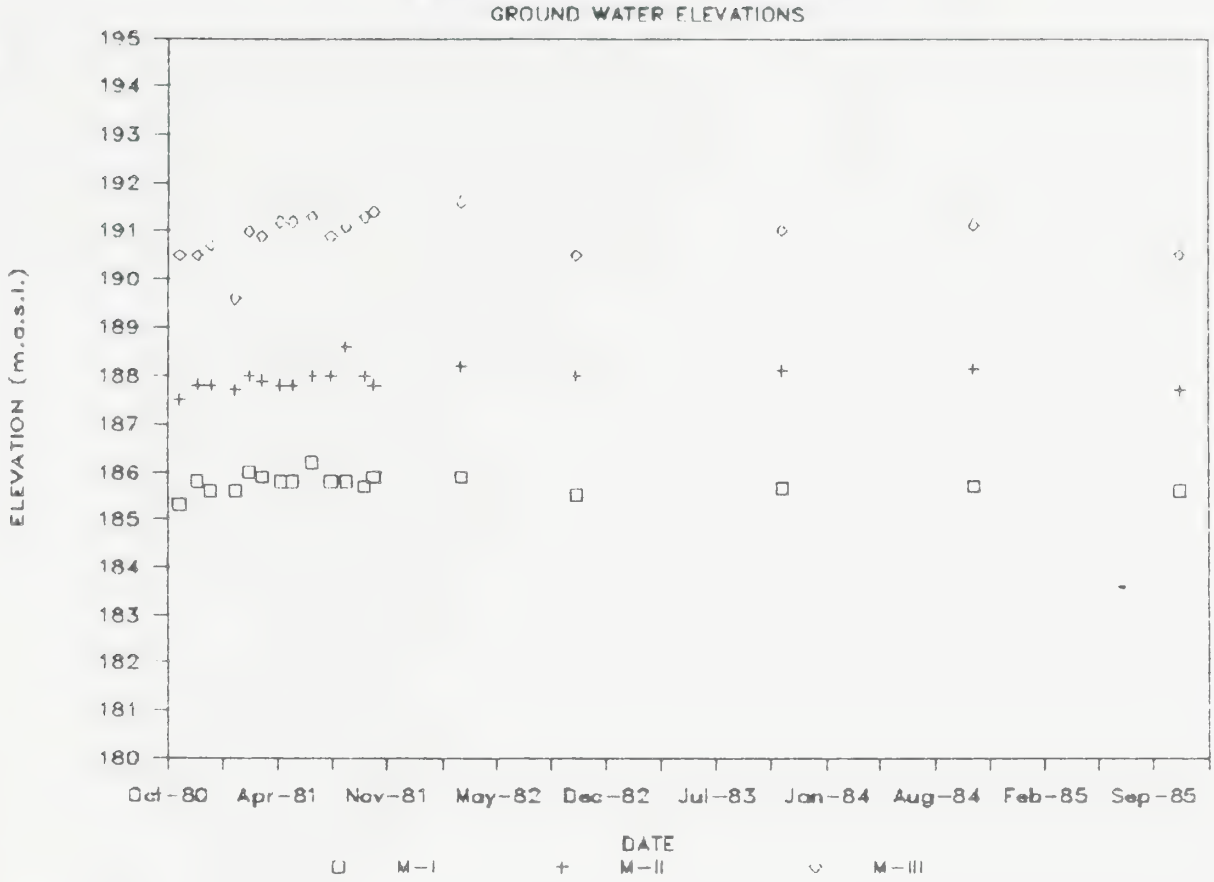
BOREHOLE 12 FIGURE 4



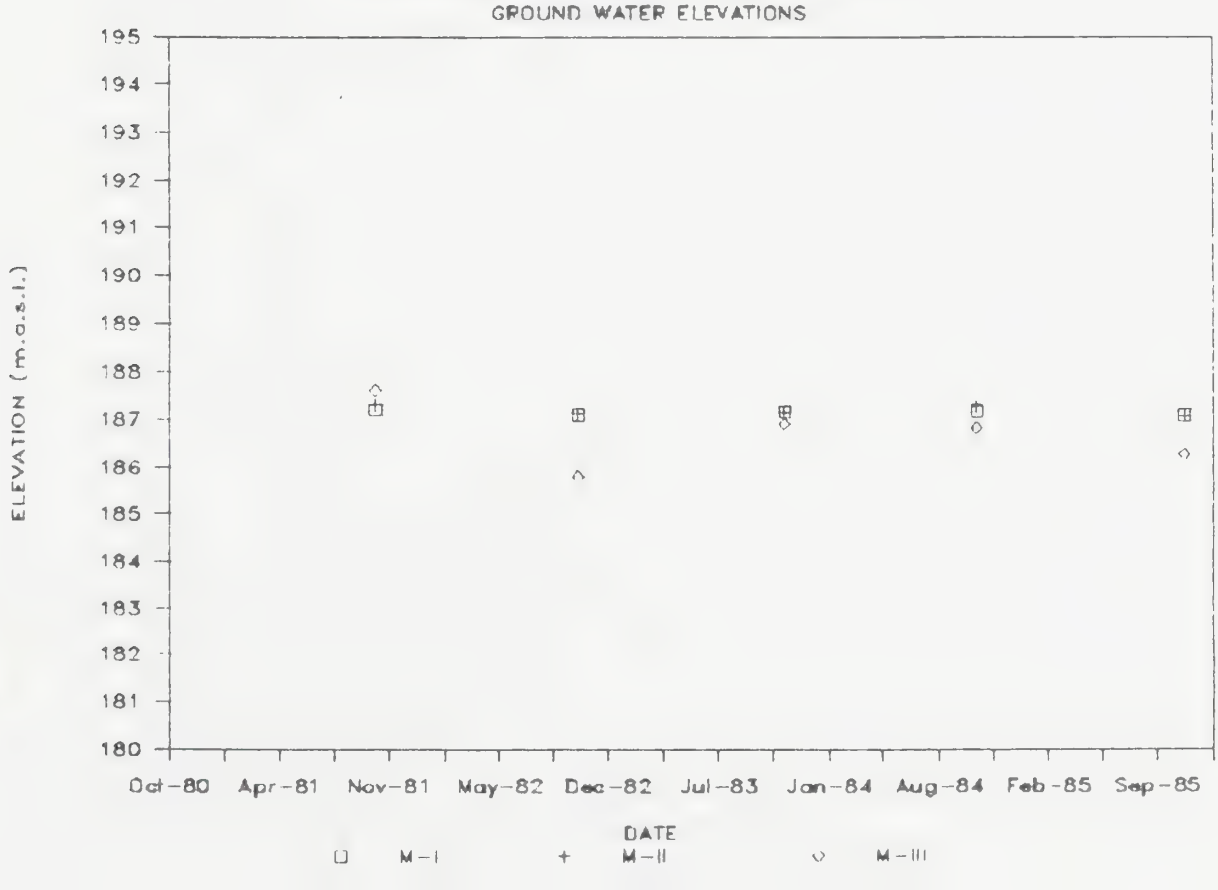
BOREHOLE 13 FIGURE 5



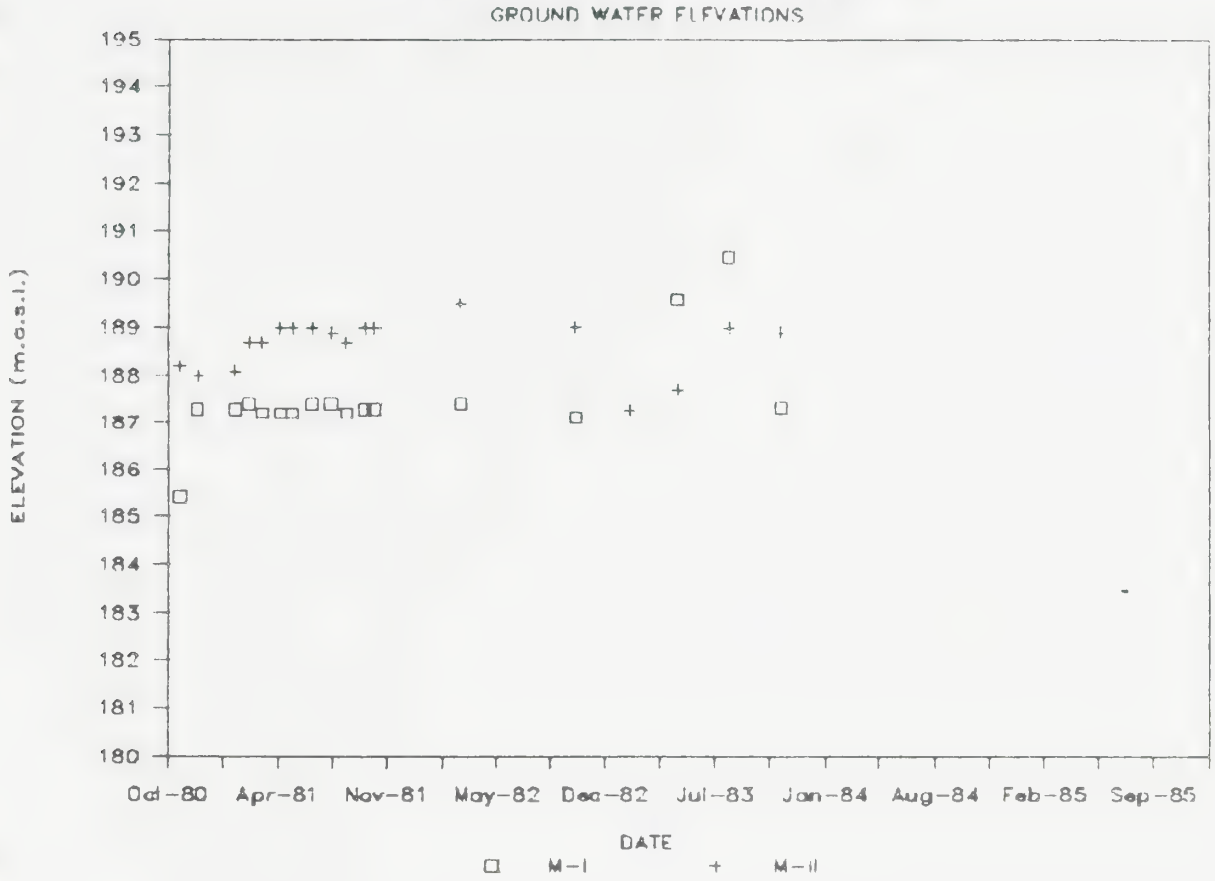
BOREHOLE 14 FIGURE 6



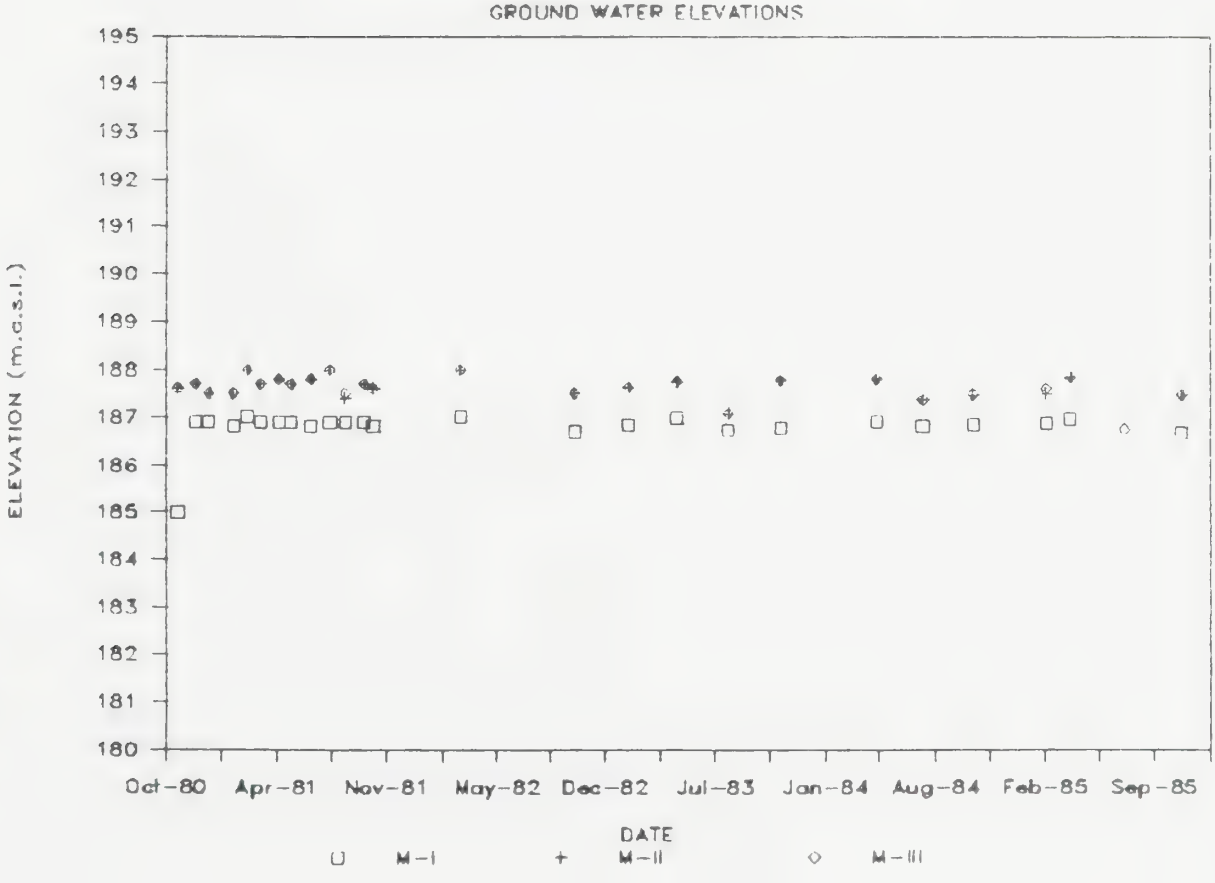
BOREHOLE 17 FIGURE 7



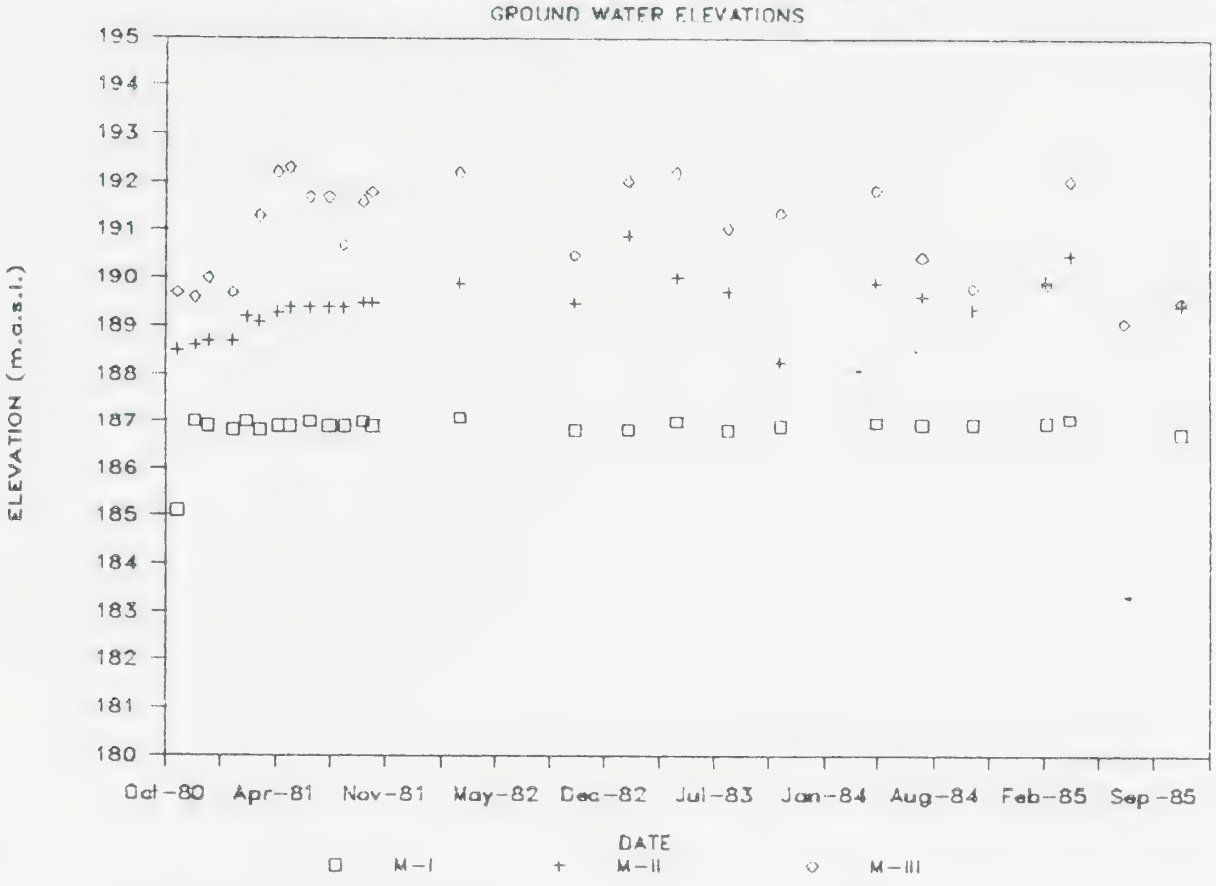
BOREHOLE 22 FIGURE 8



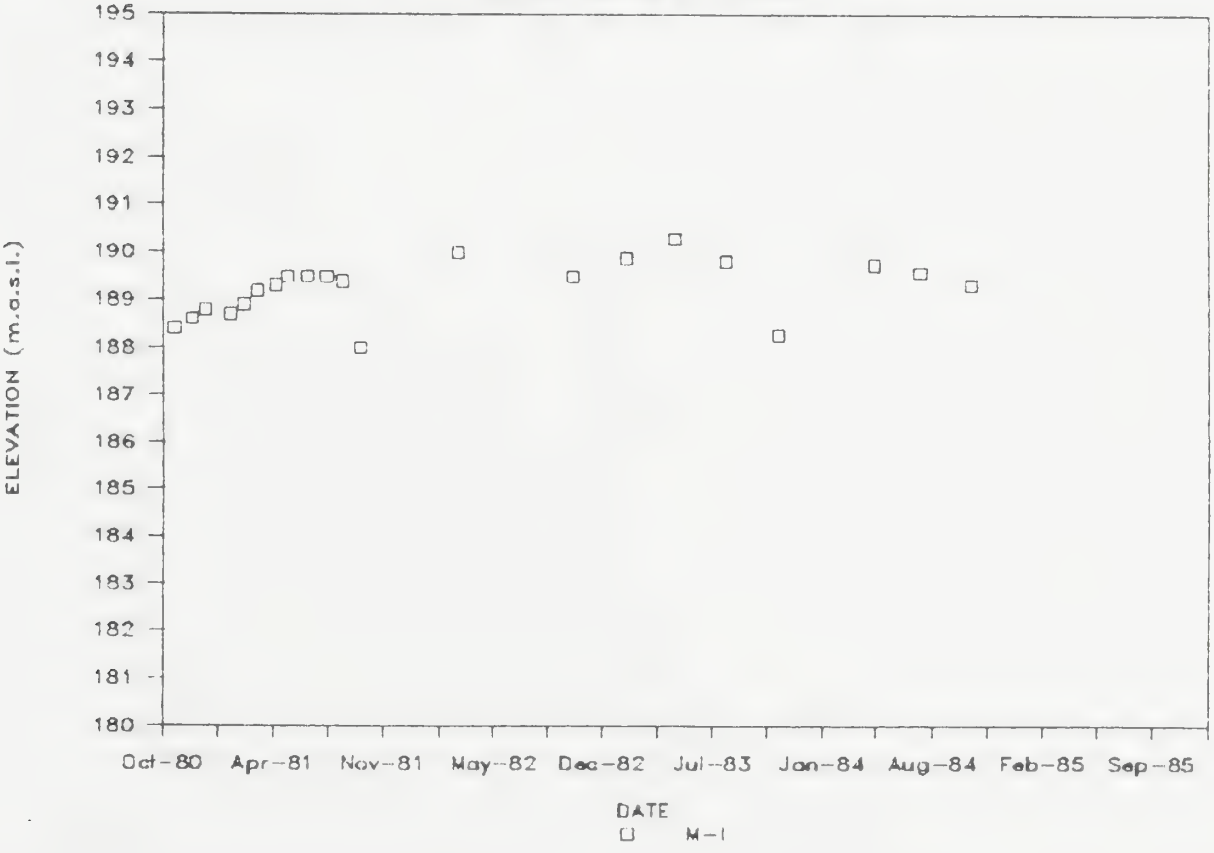
BOREHOLE 24 FIGURE 9



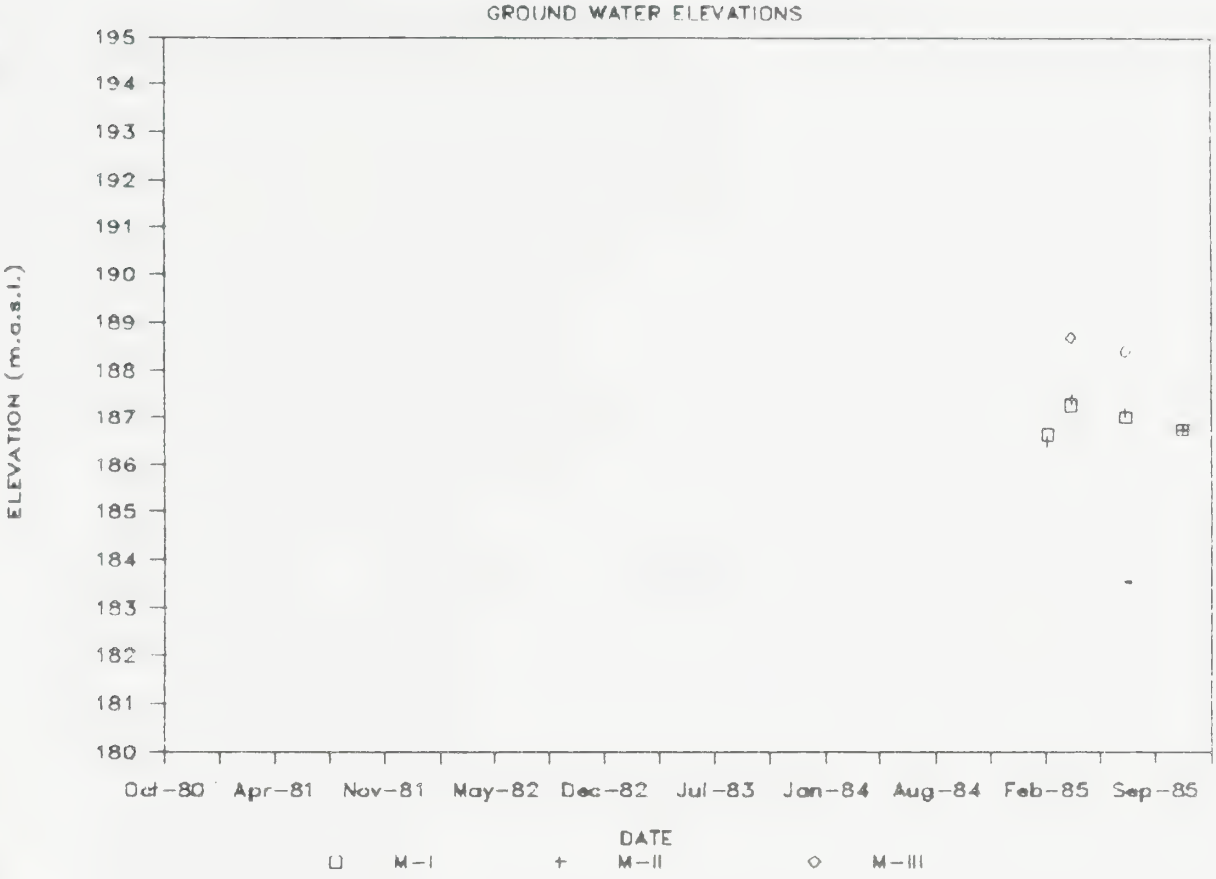
BOREHOLE 25 FIGURE 10



BOREHOLE 25a FIGURE 11



BOREHOLE 26 FIGURE 12



APPENDIX B

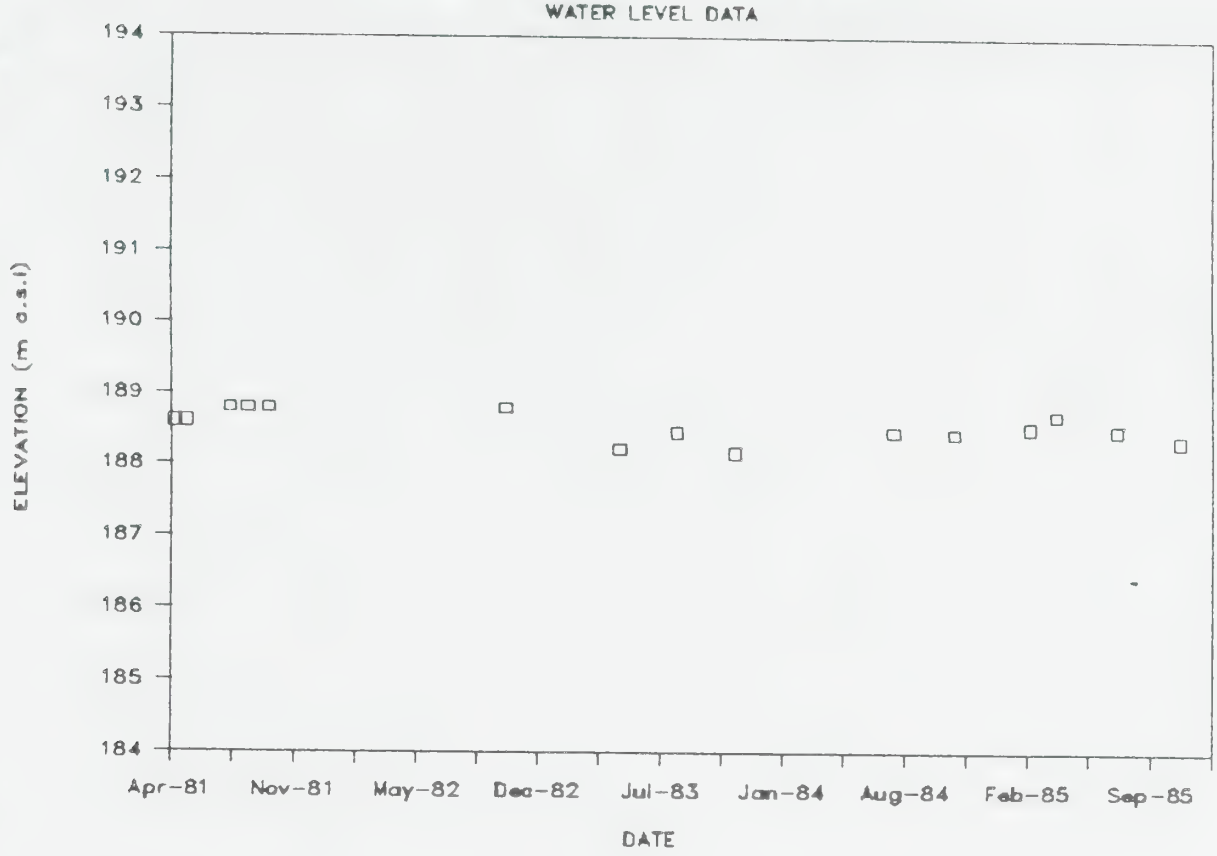
LEACHATE ELEVATIONS

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
WATER LEVEL DATA - MANHOLES

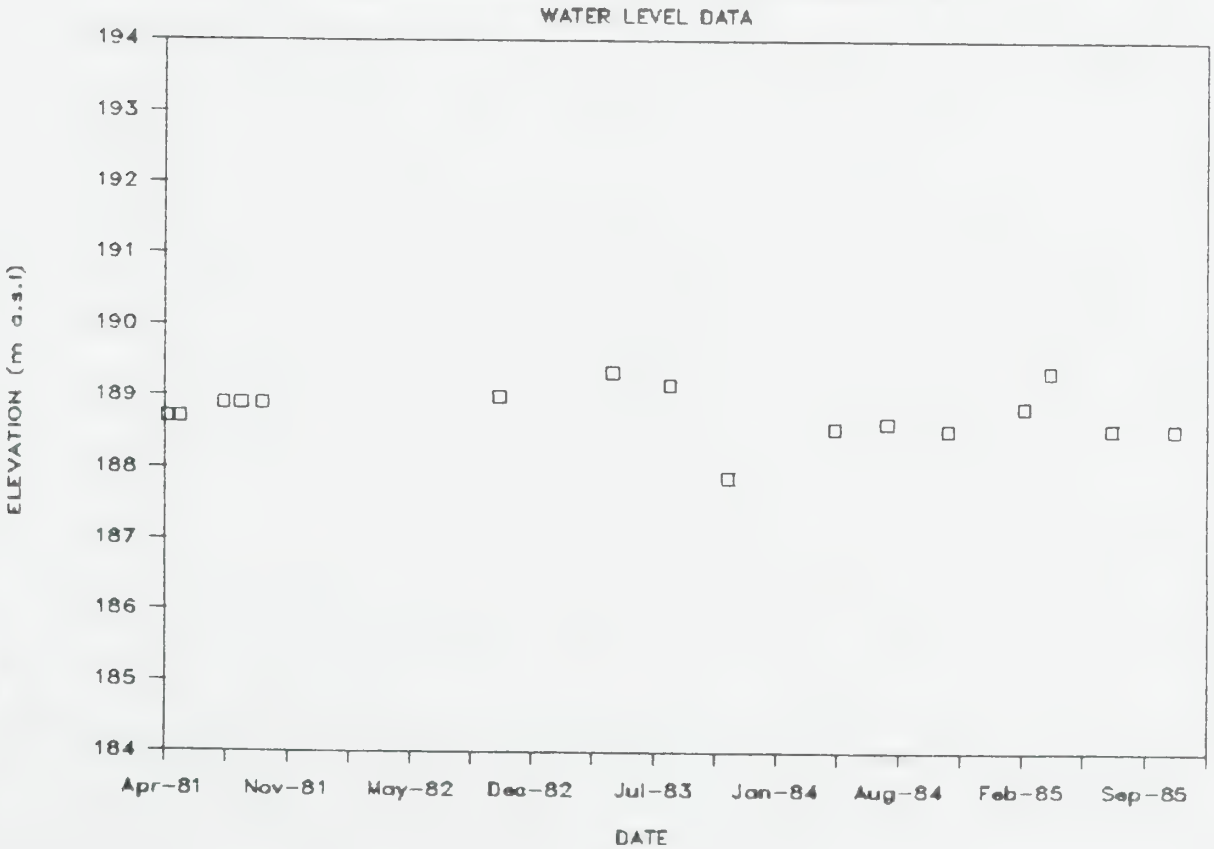
TABLE 2 SHEET 1

DATE	MANHOLE NO. 1 GROUND ELEV. 193.48 (m.a.s.l)	MANHOLE NO. 2 GROUND ELEV. NA (m.a.s.l)	MANHOLE NO. 3 GROUND ELEV. 192.07 (m.a.s.l)	MANHOLE NO. 4 GROUND ELEV. 191.17 (m.a.s.l)	MANHOLE NO. 5 GROUND ELEV. 192.07 (m.a.s.l)	MANHOLE NO. 6 GROUND ELEV. 192.78 (m.a.s.l)	MANHOLE NO. 7 GROUND ELEV. 193.48 (m.a.s.l)
28-Apr-81	188.60		188.70	188.70			
20-May-81	188.60		188.70	188.70			
25-Jun-81							
29-Jul-81	188.80		188.80	188.90			
26-Aug-81	188.80		188.80	188.90			
29-Sep-81	188.80		188.90	188.90			
22-Oct-82	188.80		189.00	189.00			
26-Apr-83	188.20	188.12		189.35	189.30	189.32	189.25
28-Jul-83	188.44			189.17	189.11	189.16	189.08
31-Oct-83	188.15	188.16		187.86	187.81	187.85	187.81
24-Apr-84				188.56			
17-Jul-84	188.45			188.64			
23-Oct-84	188.43			188.54			
25-Feb-85	188.51			188.86			
10-Apr-85	188.71			189.36			
17-Jul-85	188.48			188.55			
29-Oct-85	188.33			188.55			

MANHOLE NO. 1 FIGURE 13



MANHOLE NO. 4 FIGURE 14



APPENDIX C

GROUND WATER QUALITY DATA

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

TABLE 3 SHEET 1

BOREHOLE 1A-1

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
30-Jul-80	3100	7.80	198	1680		1550	0.55		<.05	0.097	0.70			1	132	6.70	370	195		N.D.	N.D.	N.D.	0.09	0.10	<.1	N.D.	0.10
28-Aug-80	2900	7.80	205	1600		1530	0.69		<.05	0.025	0.70			1	156	6.80	399	200		<.01	<.02	<.05	0.30	<.1	<.1	0.05	<.01
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2900	7.50	205																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	3050	7.20	176	1800		1500	0.56		0.08	N.D.			22								0.09	0.02	0.09			<.05	0.10
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	2000	6.70	141	1760		1350					<1	<5									<.10	<.05	<.05			<.02	0.05
10-Apr-84																											
17-Jul-84																											
15-Oct-84	2750	6.65	194	2100	230	1500	1.20	0.78	0.40	N.D.			18	1.4	56	2.80	395						<.05		<.1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	80	6.80 ?	8	62	46	10	1.28	0.45	0.76	0.010			44	<1	4	1.11	14	4					0.10				

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 1A-III

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	2600	7.60	110	1170		920	0.72		<.05	0.027	2.60			3	153	4.20	231	168		N.D.	N.D.	N.D.	0.23	0.10	0.80	N.D.	N.D.
BKGRN 2/80	2500	7.60	112	1270		1040	4.00		0.32					1	162	4.30	252	175		<.01	<.02	<.05	3.12	0.10	0.75	<.05	<.01
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2400	7.50	99																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82 DRY																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	1700	6.80	100	1350		900	0.24		<.01	0.018	6.00	15									<.1	<.05	0.22				<.02	0.01
24-Apr-84																											
17-Jul-84																											
15-Oct-84 DRY																											
25-Feb-85																											
10-Apr-85																											
17-Jul-85			?																								
29-Oct-85	340	7.30	.	38	506	344	198	3.41	2.76	0.20	0.010		73	5.8	29	2.67	110	60					1.20		0.52		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE	BOREHOLE 5-1																								
	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	2600	7.50	210	1200		1160	0.36		<.05	0.035	0.50			2	112	2.50	288	151		N.D.	N.D.	N.D.	0.12	0.10	1.10	N.D.	N.D.
BKGRN 2/80	2680	7.70	216	1350		1210	0.40			0.028	0.90			2	130	3.50	305	150		<.01	<.02	<.05	0.56	<.1	1.45	<.05	0.03
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2450	7.50	182																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	245	7.70	8	105		13	0.56		1.10	N.D.		30									0.04	<.01	0.02				<.01	<.01
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	170	5.70	5	100		27	0.12		0.80	0.011		21									<.1	<.05	0.11				<.02	<.01
24-Apr-84																											
17-Jul-84																											
15-Oct-84	220	6.40	16	270	105	13	0.90	0.70	0.05			29	1.8	1			90	11					1.20		<.1			
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1200	6.60	177	1588	144	1432	0.74	0.34	0.60	0.010		15	<1	134	6.50	351	190								0.06		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

TABLE 3 SHEET 5

DATE	BOREHOLE 5-II																						
	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80																											
BKGRN 2/80																											
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81																											
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83																											
24-Apr-84																											
17-Jul-84																											
15-Oct-84	390	6.60		30	400	220	30	1.20	0.62	0.25	10.200		25	3.2	2	0.20	130	18					<.05		<.1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1150	6.30		210	1244	135	1159	0.74	0.64	0.45	0.010		29	<1.0	126	3.20	254	190					0.70		0.11		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

TABLE 3 SHEET 6

DATE	BOREHOLE 5-III																								
	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	600	7.90	11	320		160	0.98		0.23	0.067	1.30			4	7	1.30	63	27		N.D.	N.D.	N.D.	0.65	0.10	0.30	N.D.	N.D.
BKGRN 2/80	650	8.20	14	350		150	1.00		<.05	0.027	2.20			2	14	1.60	82	46		<.01	<.02	<.05	1.62	<.1	0.30	<.05	<.01
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	650	7.50	15																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	950	7.50	30	545		225	6.08		0.06	N.D.		88									0.04	0.01	3.90			0.04	0.01
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	300	7.10	12	240		30			2.50	0.041	72.00	15									<.1	<.05	0.19			<.02	<.01
24-Apr-84																											
17-Jul-84																											
15-Oct-84	460	6.50	29	410	340	78	1.20	0.92	0.20	0.007		47	3.0		10		125	28					<.05		<.1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	DRY																										

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 12-1

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	3200	7.10	240	1720		1490	0.38		<.05	0.007	7.70			2	139	6.80	410	160					0.07				
BKGRN 2/80	3150	7.50	243	1740		1660	0.42		<.05	0.021	7.30			<.5	156	6.70	424	166					0.12				
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2900	8.00	227																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	1250	7.40	6	833		530	0.56		N.D.	N.D.		22								0.01	0.09	0.37				0.01	0.01
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	1200	7.20	24	790		500	0.12		0.20		38.00	<5								<.1	<.05	<.05				<.02	<.01
24-Apr-84																											
17-Jul-84																											
15-Oct-84	1350	6.60	36	1010	320	511	1.10	0.64	0.25			34	1.9		43	0.20	223	110					<.05		0.19		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1100	7.35	128	264	210	955	7.15	0.66	0.10	0.010		N.D.	1.0		102	4.60	287	130							0.22		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 12-11

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	2900	7.30	60	1820		1560	0.46		<.05	0.011	0.90		4		77	4.20	274	278					0.10				
BKGRN 2/80	2650	7.80	67	1590		1450	0.33		<.05	0.026	0.50		1		88	4.20	280	249					0.24				
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	1750	7.50	38																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	1250	7.50	5	810		50	0.32		0.12	N.D.		22								0.03	0.05	0.14				.01	0.01
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	900	6.80	11	570		270			0.30	0.071	2.00	<5								<.1	<.05	<.05				.02	<.01
24-Apr-84																											
17-Jul-84																											
15-Oct-84	1500	6.70	54	2168	208	648	1.70	0.70	0.20	0.071		25	1.8		24	2.70	669	120					<.05		<.10		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	900	7.55	49	935	244	784	0.73	0.48	0.08	0.010		29	1.5		0	2.89	194	150					0.10		0.22		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

TABLE 3 SHEET 10

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	1500	8.00				560								6	145	9.60	49	79		N.D.	N.D.	N.D.	<.1	0.20	1.30	N.D.	N.D.
BKGRN 2/80	1600	7.10	130	450		540								3	166	11.00	63	81									
27-Oct-80		8.00	180																								
28-Nov-80	2500	7.70	182																								
23-Dec-80	2500	7.80	122																								
05-Feb-81	2500	7.90	193																								
02-Mar-81	1800	8.60	240																								
25-Mar-81	2800	8.30	227																								
29-Apr-81	3000	8.30	205																								
22-May-81	2750	8.20	167																								
25-Jun-81																											
29-Jul-81																											
07-Aug-81	2600	8.30	235																								
29-Sep-81	2750	7.90	212																								
15-Oct-81	2900	7.50	225	700		1225	3.40		0.02	0.040	0.30				185	2.90	110	190	0.30	N.D.	N.D.	N.D.	0.50	N.D.	0.10	N.D.	N.D.
25-Mar-82	2400	7.30	227																								
26-May-82	2700	6.70	195																								
22-Jun-82																											
30-Jul-82	2900	7.10	173																								
25-Aug-82	2750	6.70	118																								
19-Oct-82	1700	7.20	102	229		835	1.52		0.13			22									0.12	0.06	0.23			N.D.	0.04
28-Jan-83	2700	7.00	175	1657		1525	1.02		1.12	0.080		51									0.13	0.03	0.42			.05	0.06
26-Apr-83	2800	6.70	196	1500		1450	2.00		0.20	0.088	1.20	13									<.1	0.03	0.57			.05	<.05
28-Jul-83 NO SAMPLE																											
31-Oct-83	2600	7.10	153	1550		1450	2.32		0.30		32.00	<5									<10	<.05	<.05			<.02	0.03
24-Apr-84	2100	7.00	196	1640		1560	3.52		1.20	0.003	6.00	15										0.05	0.50				0.1
17-Jul-84																											
15-Oct-84	2700	6.70	208	1680	50	716	2.60	2.10	N.D.	N.D.		16	0.5		190	16.80	310	220					<.05		<.1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1600	7.00	183	1418	62	1500	2.83	1.56	0.21	N.D.		15	1.3		185	22.80	261	190					0.10		1.02		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE	BOREHOLE 13-III																							
	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80																										
BKGRN 2/80																										
27-Oct-80																										
28-Nov-80																										
23-Dec-80																										
05-Feb-81																										
02-Mar-81																										
25-Mar-81																										
29-Apr-81																										
22-May-81																										
25-Jun-81																										
29-Jul-81																										
07-Aug-81																										
29-Sep-81																										
15-Oct-81																										
25-Mar-82																										
26-May-82																										
22-Jun-82																										
30-Jul-82																										
25-Aug-82																										
19-Oct-82																										
28-Jan-83																										
26-Apr-83																										
28-Jul-83																										
31-Oct-83																										
24-Apr-84	1300	7.20	73	680		531	0.56		N.D.		5.00	N.D.									N.D.	<.05	0.70		0.02	N.D.
17-Jul-84	1400	6.80	84	640	170	550	0.38		1.23	0.004		7	3.2	115	N.D.	85	95									
15-Oct-84	1400	6.80	92	2690	194	580	1.10	0.78	0.05	0.004		31	1.2	114	N.D.	878	120					<.05		<.1		
25-Feb-85																										
10-Apr-85																										
17-Jul-85																										
29-Oct-85	900	7.70	74	650	206	511	0.87	0.38	0.70	0.020			2.0	112	0.48	102	130					0.10		0.71		

GLANBROOK LANDFILL SITE
PROJECT NO B6-35
GROUND WATER QUALITY DATA

TABLE 3 SHEET 14

DATE BOREHOLE 14-I

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	2900	7.80	220	1460		1310	1.10		<.05	0.004	15.00			4	164	8.00	200	136		N.D.	N.D.	N.D.	0.10	0.20	0.10	N.D.	N.D.
BKGRN 2/80	2580	7.40	201	1340		1190	1.40		<.05	0.034	27.00			2	127	10.50	291	146		<.01	<.02	<.05	0.10	<.1	0.10	0.05	<.01
27-Oct-80	3100	7.50	255																								
28-Nov-80	3100	7.50	242																								
23-Dec-80	3800	7.40	242		108			0.28				<.1											0.10		0.07		
05-Feb-81	3500	7.40	244																								
02-Mar-81	2400	7.60	300																								
25-Mar-81	2900	7.30	227																								
29-Apr-81	3000	7.70	243																								
22-May-81	3500	7.70	227																								
25-Jun-81	2700	7.50	336																								
29-Jul-81	2800	7.70	281																								
07-Aug-81	2800	7.80	303																								
29-Sep-81	2900	7.70	258																								
15-Oct-81	3000	7.20	235	825		1500	1.60			0.211	0.10				150	3.50	410	140	0.12	N.D.	N.D.	N.D.	0.40	N.D.	<.1	N.D.	N.D.
25-Mar-82	2500	7.30	265																								
26-May-82	2780	6.80	226																								
22-Jun-82	2700	7.30	220																								
30-Jul-82	3100	7.00	215																								
25-Aug-82	3020	6.80	218																								
19-Oct-82	2900	7.60	217	1702		1530	1.28		0.24			30									<.02	0.52	0.17			0.18	0.02
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	2200	6.80	230	1690		1400	0.44		<.01	0.082	12.00	51									<.1	<.05	0.26			<.02	0.02
24-Apr-84																											
17-Jul-84																											
15-Oct-84	2700	6.80	240	2192	272	1398	0.90	1.00		0.008		25	1.5		59	10.60	450	150					0.06		0.10		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1350	7.10	214	1598	108	1466	1.12	0.28	0.14	0.020		44	<1.0		154	10.20	396	160					0.10		0.07		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 14-II

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	2800	7.50	160	1500		1570	0.66		0.19					3	327	4.80	117	213		N.D.	N.D.	N.D.	0.10	0.10	0.30	N.D.	N.D.
BKGRN 2/80	2830	7.40	184	1550		1440	0.14		<.05					3	148	4.60	283	205									
27-Oct-80	3000	7.50	180																								
28-Nov-80	2600	7.30	212																								
23-Dec-80	3500	7.40	212																								
05-Feb-81	3000	7.40	176																								
02-Mar-81	2200	7.70	240																								
25-Mar-81	2200	7.40	174																								
29-Apr-81	2600	7.70	182																								
22-May-81	2800	7.70	152																								
25-Jun-81																											
29-Jul-81	2750	7.80	205																								
07-Aug-81	2200	7.50	190																								
29-Sep-81	2500	7.60	174																								
15-Oct-81	2500	7.20	170	675		1350	1.20		0.11	0.086	0.20				155	3.10	300	140	0.30	N.D.	N.D.	N.D.	0.30	N.D.	0.30	N.D.	0.03
25-Mar-82	2100	6.80	167																								
26-May-82	2600	6.90	147																								
22-Jun-82																											
30-Jul-82																											
25-Aug-82	2450	6.80	139																								
19-Oct-82 DRY																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83 NO SAMPLE																											
24-Apr-84																											
17-Jul-84																											
15-Oct-84	2200	6.75	176	1636	144	1262	1.40	0.82		N.D.		24	2.3		56	3.10	295	140					0.16		0.13		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1300	7.20	149	1306	84	1193	0.98	0.40	0.25	0.020		73	1.0		135	3.07	278	160					0.10		0.23		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE	BOREHOLE 14-III																							
	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	6500	7.50	240	4150		4075	0.58		0.15	0.060				3	343	11.60	474	805		N.D.	N.D.	N.D.	6.50	0.30	0.60	N.D.	<.1
BKGRN 2/80	6380	7.70	231	4410		4130	0.44		0.09	0.045	1.00			1	364	12.40	533	845		<.01	<.01	<.05	0.10	<.1	0.55	0.10	0.02
27-Oct-80	7000	7.50	240																								
28-Nov-80	9000	7.00	212																								
23-Dec-80	7000	7.50	227																								
05-Feb-81	6500	7.00	229																								
02-Mar-81	6000	7.10	270																								
25-Mar-81	6000	7.10	227																								
29-Apr-81	5500	7.20	243																								
22-May-81	7000	7.10	178																								
25-Jun-81	5200	7.50	305																								
29-Jul-81	5500	7.40	243																								
07-Aug-81	4750	7.40	258																								
29-Sep-81	6000	7.30	212																								
15-Oct-81	6000	6.60	135	1885		2750	0.80		0.04	0.205	0.20				430	3.70	515	700	0.10	N.D.	N.D.	N.D.	5.40	N.D.	0.70	N.D.	0.03
25-Mar-82	3750	7.30	220																								
26-May-82	5500	6.90	38																								
22-Jun-82	4500	7.20	10																								
30-Jul-82	6000	6.80	24																								
25-Aug-82	2450	6.70	171																								
19-Oct-82	DRY																										
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	3600	6.90	141	3100		2850	0.24		0.10	0.357	10.00	18									<.1	<.05	0.23			<.02	0.03
24-Apr-84																											
17-Jul-84																											
15-Oct-84	3600	6.60	122	1484	84	2421	1.40	0.50	0.85	0.020		38	2.9		260	22.30	450	320					<.05	.	0.14		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1800	7.60	119	2420	294	2557	4.59	0.23	0.43	0.020		29	4.0		286	21.50	387	320					0.10		0.44		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE	BOREHOLE 17-1																							
	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	3200	7.70	256	1600		1510	0.43		<.05	0.007	1.80		1		348	5.20	495	166					0.08				
BKGRN 2/80	3100	7.80	260	1690		1540	1.10		<.05	0.022	0.80		<.05		170	5.00	391	168					0.74				
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2700	7.50	174																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	2600	7.60	171	1390		1285	N.D.		0.08	N.D.		60									<.01	0.03	0.07			.02	0.02
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	1600	7.00	118	1140		925			0.70		<1	7									<.1	<.05	0.14			.02	.01
24-Apr-84																											
17-Jul-84																											
15-Oct-84	2400	6.60	208	2284	244	1330	0.40	0.64		0.005		125	1.7		62	4.10	445	130					<.05		<.50		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1200	7.70	63	482	202	614	5.07	3.80	0.14	0.010		59	2.5		211	3.50	113	55							1.39		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 17-11

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	3100	8.00	190	720		1100	40.00		0.14	0.040	15.00			3	140	35.00	269	76					0.14				
BKGRN 2/80	2830	7.80	186	930		1190	18.00		<.05	0.027	7.30			1	278	17.00	216	104					0.18				
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2300	8.00	121																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	2250	7.70	100	795		985	0.53		0.16	N.D.		45									<.01	0.03	0.16			0.01	0.01
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	1400	7.60	65	650		725	3.24		0.30	0.020	<1	19									<.1	<.05	<.05			<.02	<.01
24-Apr-84																											
17-Jul-84																											
15-Oct-84	1650	6.70	84	2948	154	784	3.20	3.12	0.95	0.014		29	2.2		225	3.30	150	60						0.13	0.30		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1200	7.60	144	1152	136	1262	0.44	0.40	0.10	0.010		618	1.8		150	4.80	254	130					4.00		1.31		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE	BOREHOLE 17-III																							
	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	2350	7.60	38	1100		1150	3		0.30					3	101	18.00	230	142					0.21				
BKGRN 2/80	2280	8.00	60	1040		1140	1		0.33					<.5	167	19.00	212	133					0.82				
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81	2200	7.00	38																								
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82	1550	7.30	32	676		605	6.83		3.17	N.D.		22									0.01	0.14	3.17			.04	0.04
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	1300	7.30	30	950		775	0.44		0.10	0.816	<1	51									.1	<.05	0.06			.02	0.02
24-Apr-84																											
17-Jul-84																											
15-Oct-84	1300	7.30	36	1216	184	546	2.60	2.64	1.20	0.013		49	1.4		115	19.50	190	80					<.05		<.1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	850	7.15	28	630	223	511	5.01	3.70	0.48	0.010		118	2.8		98	10.30	160	72					0.20		0.12		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BOREHOLE 22-1																											
BKGRN 1/80	2900	7.70	260	1400		1420	0.62		<.05	0.007	1.70			2	48	5.30	132	155		N.D.	N.D.	N.D.	0.40	0.10	0.40	N.D.	N.D.
BKGRN 2/80	2680	7.70	205	1405		1310	0.70		0.15	0.030	0.50			<.5	143	4.80	297	159		<.01	<.02	<.05	0.15	<.1	0.20	<.05	<.01
27-Oct-80	2500	8.00	150																								
28-Nov-80	3000	7.50	217																								
23-Dec-80																											
05-Feb-81	2250	7.40	186																								
02-Mar-81	2800	7.60	240																								
25-Mar-81	2700	7.30	159																								
29-Apr-81	2100	7.40	152																								
22-May-81	2500	7.00	167																								
25-Jun-81	2400	7.20	380																								
29-Jul-81	2000	7.30	243																								
07-Aug-81	2400	7.10	281																								
29-Sep-81	3000	7.40	243																								
15-Oct-81	2900	7.10	260	790		1450	1.80		0.08	0.003					170	47.10	400	135	0.08	N.D.	N.D.	N.D.	0.60	N.D.	0.30	N.D.	0.04
25-Mar-82	2050	7.50	258																								
26-May-82	3200	6.80	112																								
22-Jun-82	3200	7.10	10																								
30-Jul-82	5500	7.20	81																								
25-Aug-82	850	7.20	112																								
19-Oct-82	600	7.70	53	2250		120	0.24		0.75												0.06	.01	0.24			0.13	.0
28-Jan-83	FROZEN																										
26-Apr-83	1350	7.50		750		670	4.80		0.07			176									<.1	0.07	32.00			<.05	<.42
28-Jul-83	NO SAMPLE																										
31-Oct-83	900	7.20	69	600		365	2.08		0.07	0.102	8.00	75									<.1	.05	0.13			<.02	0.07
24-Apr-84	NO SAMPLE																										
17-Jul-84	NO SAMPLE																										
15-Oct-84	NO SAMPLE																										
25-Feb-85	NO SAMPLE																										
10-Apr-85	NO SAMPLE																										
17-Jul-85																											
29-Oct-85	NO SAMPLE																										

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 22-11

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	5650	7.30	129	3900		4350	0.13	<.05	0.014				4	270	7.20	486	707		N.D.	N.D.	N.D.	3.00	0.20	3.00	<.1	0.10
BKGRN 2/80			136	4160			0.55		0.028				<.05	253	7.30	459	788		<.01	<.02	<.05	0.15	<.1	0.15	0.10	<.01
27-Oct-80	6000	7.00	150																							
28-Nov-80	7000	7.50	121																							
23-Dec-80																										
05-Feb-81	2000	7.20	69																							
02-Mar-81	5000	7.10	180																							
25-Mar-81	5000	7.00	98																							
29-Apr-81	5000	8.00	121																							
22-May-81	6000	8.20	129																							
25-Jun-81	4300	8.00	165																							
29-Jul-81	4250	8.00	121																							
07-Aug-81	4500	7.80	144																							
29-Sep-81	6500	7.20	129																							
15-Oct-81	5000	6.60	130	2150		2750	1.4	0.06	0.01	0.050				290	4	500.00	820	1	N.D.	N.D.	<.1	3.30	1.50	3.40	N.D.	0.60
25-Mar-82	3600	7.00	129																							
26-May-82	2350	6.60	135																							
22-Jun-82	1200	7.60	127																							
30-Jul-82	5200	7.20	143																							
25-Aug-82	700	7.30	108																							
19-Oct-82	850	7.50	68	460		280	8.00	0.75				191								0.10	0.09	34.00			0.09	0.20
28-Jan-83	290	7.40	30	142		62	<.1	1.11				51														
26-Apr-83	I.S.	7.80		I.S.		I.S.	I.S	I.S.	I.S.			I.S.								<.1	0.10	15.40			<.05	0.20
28-Jul-83	NO SAMPLE																									
31-Oct-83	900	6.90	90	590		334	2.00				8.00	118								<.1	<.05	<.05			<.02	0.11
24-Apr-84	NO SAMPLE																									
17-Jul-84	NO SAMPLE																									
15-Oct-84	NO SAMPLE																									
25-Feb-85	NO SAMPLE																									
10-Apr-85	NO SAMPLE																									
17-Jul-85																										
29-Oct-85	NO SAMPLE																									

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

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DATE BOREHOLE 24-1

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	3200	7.70	247	1600		1700	0.17		0.62	0.034	38.00			4	146	18.60	315	208		N.D.	N.D.	N.D.	0.10	0.10	0.10	N.D.	N.D.
BKGRN 2/80	3170	7.70	549	1630		1800	0.51		<.01	0.022	10.00			5	138	8.40	342	188		<.01	<.02	<.05	0.10	0.10	<.1	0.05	0.02
27-Oct-80	3500	7.50	300																								
28-Nov-80	3600	7.70	273																								
23-Dec-80	4000	7.50	280																								
05-Feb-81	3750	7.50	227																								
02-Mar-81	3300	7.60	270																								
25-Mar-81	3200	7.80	182																								
29-Apr-81	3000	7.60	280																								
22-May-81	3500	7.10	243																								
25-Jun-81	2600	7.50	330																								
29-Jul-81	2600	8.00	296																								
07-Aug-81	2600	7.30	303																								
29-Sep-81	3500	7.40	258																								
15-Oct-81	3100	7.30	275	830		1550	1.20		0.03	0.012	3.00				165	4.10	435	155	0.20	N.D.	N.D.		0.30	0.30	0.10	N.D.	N.D.
25-Mar-82	2300	7.70	281																								
26-May-82	2610	6.00	238																								
22-Jun-82	2500	7.50	237																								
30-Jul-82	2900	7.40	215																								
25-Aug-82	2800	7.00	241																								
19-Oct-82	2950	7.30	230	1209		1430	1.40														0.02	0.09	0.30			0.03	0.01
28-Jan-83	2700	6.90	220	1918		1425	0.10		<.01			29									<.1	0.13	0.59			<.05	0.02
26-Apr-83	2800	7.20	230	1650		1175	0.32		0.01			57									<.1	<.01	4.80			<.05	0.02
28-Jul-83	2940	7.25	245	1550		1675	0.14		<.01	0.897	1.00	43									0.06	0.09	0.88			0.04	
31-Oct-83	2100	7.30	235	1620		1350	1.28		1.20	0.143	<1	<5									<.1	<.05	<.05			<.02	<.01
24-Apr-84	2600	6.90	230	2040		1343	0.94		N.D.	0.006	N.D.	7									N.D.	0.48	2.50			ND	ND
17-Jul-84 NO SAMPLE																											
15-Oct-84	2650	6.70	226	2580	220	955	2.70	1.80	0.75	0.010		41	2.1		166	3.80	702	200					.05		.1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1550	6.40	212	1560	125	1569	1.12	0.58	0.03	0.020		59	1.3		181	5.40	342	210					0.20		<.05		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 24-III

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	4300	7.40	38	2800		3200	0.41		0.18	0.024	24.00			4	214	16.90	445	440									
BKGRN 2/80	4050	7.60	1065	2450		2800	0.22		0.15	0.022	2.80			8	144	7.10	444	437									
27-Oct-80	4500	7.00	45																								
28-Nov-80	5000	7.00	61																								
23-Dec-80	6000	7.10	53																								
05-Feb-81	4000	7.20	49																								
02-Mar-81	3800	7.10	90																								
25-Mar-81	3500	7.40	40																								
29-Apr-81	3250	7.30	40																								
22-May-81	3600	7.10	38																								
25-Jun-81	3000	7.00	61																								
29-Jul-81	3000	7.20	45																								
07-Aug-81	3000	7.30	45																								
29-Sep-81	4000	7.30	38																								
15-Oct-81	3350	6.70	35	1150		1950	0.80		0.35						120	3.70	255	380	0.10	N.D.	N.D.	N.D.	3.70	N.D.	0.50	N.D.	N.D.
25-Mar-82	2500	7.30	45																								
26-May-82	3260	6.90	5																								
22-Jun-82	3000	7.20	8																								
30-Jul-82	3820	6.80	37																								
25-Aug-82	3680	6.90	40																								
19-Oct-82	3200	7.60	21	2275		1945	2.08		0.55			14									0.02	0.05	2.70			<.01	<.01
28-Jan-83	2700	7.00	25	2180		1700	0.26		0.63			15									0.10	0.02	3.01			<.05	0.02
26-Apr-83	2650	7.00	5	1840		1475	0.16		0.22	0.026		12									<.1	0.04	3.10			<.05	<.01
28-Jul-83	2820	6.95	3	1930		1765	0.14		<.01	0.012	14.00	3									0.08	0.04	3.50			0.03	0.05
31-Oct-83	2000	6.90	23	1850		1420	1.40		0.10		20.00	<5									<.1	<.05	<.05			<.02	0.01
24-Apr-84	2200	6.90	18	1850		1375	0.56		0.10	0.020	1.00	N.D.									N.D.	N.D.	2.40			N.D.	N.D.
17-Jul-84	2700	6.70	23	1950	380	1530	0.16		N.D.	0.007		N.D.	24		120	N.D.	100	300									
15-Oct-84	1900	6.75	18	972	320	1023	0.50	0.60		N.D.		26			28	6.50	98	210					0.13		<.1		
25-Feb-85	1600	7.40	19	1650	400	1280	0.12	0.40	0.10	N.D.		7	24.5		84	2.80	193	266					0.95		0.19		
10-Apr-85	2025	7.10	20	1560	340	1228	0.56	0.44	0.06	2.550		12	17.5		87	2.60	179	258					3.90		0.22		
17-Jul-85	1600	7.12	31	1902	335	1482	0.01	0.04	0.01	0.010		1.7	2.7		95	10	132.8	35					4.80		0.24		
29-Oct-85	1000	7.10	14	1140	380	682	0.58	0.34	0.11	0.010		15	2.3		61	2.75	157	220					0.10		0.06		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 25-1

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	2900	7.60	147	1900		1900	0.68		0.10	0.039	107.00			4	134	9.00	268	157		N.D.	N.D.	N.D.	0.80	0.10	0.10	N.D.	<.1
BKGRN 2/80	2850	7.50	149	1590		1700	0.47		<.1	0.025	5.30			4	120	4.60	329	174		<.01	<.02	<.05	<.05	0.20	<.1	<.05	<.01
27-Oct-80	3100	7.50	180																								
28-Nov-80	3400	7.70	182																								
23-Dec-80	3500	7.30	174																								
05-Feb-81	3000	7.60	152																								
02-Mar-81	1900	7.40	210																								
25-Mar-81	2800	7.90	175																								
29-Apr-81	2700	7.80	197																								
22-May-81	2600	7.50	152																								
25-Jun-81	2500	7.60	180																								
29-Jul-81	2300	7.40	190																								
07-Aug-81	2300	7.50	205																								
29-Sep-81	2750	7.50	167																								
15-Oct-81	2100	7.20	190	735		1450	1.60		0.02	0.049	0.10				150	3.50	310	155	0.08	N.D.	N.D.	N.D.	0.50	N.D.	<.1	N.D.	0.02
25-Mar-82	2050	7.80	159																								
26-May-82	2370	6.40	145																								
22-Jun-82	2250	7.50	138																								
30-Jul-82	2600	7.10	142																								
25-Aug-82	2680	7.20	141																								
19-Oct-82	2750	7.70	142	1581		1285	1.04		0.05			22									0.08	0.34	0.58			0.03	0.01
28-Jan-83	DRY																										
26-Apr-83	2450	7.25	152	1270		1150	0.92		0.01		0.40	7									<.1	0.01	1.10			<.05	<.01
28-Jul-83	2650	7.25	156	1330		1352	0.50		<.01	0.049	1.00	3									0.06	0.05	2.10			0.02	0.02
31-Oct-83	2300	7.20	144	1380		1230	0.92		0.10	0.265	20.00	12									<.1	<.05	<.05			<.02	0.01
24-Apr-84	2300	7.00	160	1320		1343	1.52		N.D.	0.002	1.00										N.D.	N.D.	1.20			N.D.	N.D.
17-Jul-84																											
15-Oct-84	2400	6.90	148	1350	62	1228	0.70	0.90		0.001		15	1.1		205	9.00	275	140					0.10		<.1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1500	6.50	13	1220	75	1296	1.16	0.52	0.13	0.010		15	1.3		193	20.40	254	160					0.10		0.10		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 25-II

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	2900	7.60	143	1500		1600	0.85		<.1	0.026				3	148	9.50	294	20		N.D.	N.D	N.D.	<.1	0.20	2.20	0.10	.1
BKGRN 2/80	4700	7.90	143	2840		3300	0.47		<.1	0.024	5.20			5	164	9.00	355	565		<.01	<.02	<.05	0.10	<.1	2.30	0.13	0.01
27-Oct-80	5800	7.00	113																								
28-Nov-80	6000	7.00	152																								
23-Dec-80	6000	7.20	121																								
05-Feb-81	6000	7.10	98																								
02-Mar-81	1000	6.80	150																								
25-Mar-81	5500	7.40	106																								
29-Apr-81	5000	7.30	106																								
22-May-81	6000	7.00	98																								
25-Jun-81	5000	7.30	120																								
29-Jul-81	5500	7.10	106																								
07-Aug-81	4750	7.10	106																								
29-Sep-81	6500	7.20	83																								
15-Oct-81	6000	6.50	80	2350		3250	0.80		0.02	0.059					255	3.30	475	970	0.42	N.D.	N.D.	N.D	0.60	N.D.	2.50	N.D.	N.D.
25-Mar-82	4000	7.00	91																								
26-May-82	6000	6.60	30																								
22-Jun-82	4500	7.10	10																								
30-Jul-82	6500	6.80	21																								
25-Aug-82	6500	6.80	15																								
19-Oct-82	6000	7.40	3	5460		4585	1.28		0.22			441									0.11	0.66	2.20			0.07	0.16
28-Jan-83	6000	6.70	65	5640		5100	0.46		0.11			29									0.20	0.13	0.64			0.06	0.07
26-Apr-83	3250	7.10	6	3100		2300			0.30	0.090		7									<0.1	0.01	0.35			<.05	<.01
28-Jul-83	3850	7.00	2	2900		1600	0.29		0.04	0.094	2.00	<1.0									0.04	0.07	3.70			0.01	0.04
31-Oct-83	4000	6.90	32	3420		2820	0.32		0.20	0.080	<1	12									<.1	<.05	<.05			<.02	0.02
24-Apr-84	2500	7.00	11	2160		1718	0.80		0.40	N.D.	3.00										N.D.	N.D.	0.20			N.D.	N.D.
17-Jul-84																											
15-Oct-84	2900	6.75	26	1864	430	1910	0.40	0.50	0.40	0.012		26	2.8		102	10.00	155	400					<.05		.1		
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	2100	7.25	23	3400	580	2728	3.57	0.01	0.13	0.010		338	4.4		142	7.60	254	690					1.90		0.06		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 25-III

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	7200	7.40	57	5400		6000	1.07		0.27	0.023	6.00			4	274	17.90	445	590									
BKGRN 2/80	7500	7.80	50	5490		6600	0.35		<.1	0.023	1.90			8	250	13.20	395	1252									
27-Oct-80	8000	7.50	57																								
28-Nov-80	10000	7.30	61																								
23-Dec-80	7000	7.50	106																								
05-Feb-81	8000	7.00	61																								
02-Mar-81																											
25-Mar-81	3000	7.70	23																								
29-Apr-81	2600	7.50	23																								
22-May-81	2800	7.30	15																								
25-Jun-81	2400	7.80	30																								
29-Jul-81	2900	7.40	30																								
07-Aug-81	2900	7.40	30																								
29-Sep-81	3000	7.30	23																								
15-Oct-81	2700	6.90	60	975		1550	0.50		1.75	0.092					155	3.10	320	135	0.32	N.D.	N.D.		1.30	N.D.	<.1	N.D.	N.D.
25-Mar-82	1900	7.50	15																								
26-May-82	2500	6.60	2																								
22-Jun-82	1900	7.50	8																								
30-Jul-82	2500	7.20	5																								
25-Aug-82	2850	7.00	14																								
19-Oct-82	3200	7.70	1	2225		1760	1.04		0.98			37									0.09	0.04	1.20			<.01	<.01
28-Jan-83	2050	6.80	55	1722		1250	0.48		1.95			29									<.1	0.03	1.12			<.05	0.02
26-Apr-83	2150	7.25	1	1550		1075	0.32		0.21	0.061	0.40	12									<.1	<.01	0.33			<.05	0.01
28-Jul-83	2600	7.15	1	1770		1425	0.71		0.20	0.102	1.00	18									0.04	0.08	0.87				0.01
31-Oct-83	2300	7.10	8	1820		1260	0.32		1.60		<1.0	<5									<.1	<.05	<.05			<.02	0.03
24-Apr-84	2000	7.10	6	1980		1375	2.40		0.30	0.010	1.00										N.D.	N.D.	0.90			N.D.	N.D.
17-Jul-84	2800	6.90	17	1980	380	1530	N.D.		0.73	0.003		3	6.2		100	N.D.	165	345									
15-Oct-84	2900	6.80	12	2404	426	1773	0.40	0.48	0.25	0.014		29	2.9		104	11.50	195	420					<.05		<.1		
25-Feb-85	1800	7.50	197	1930	400	1550	0.24	0.40	0.30	N.D.		1	8.4		80	2.30	195	329					0.31		0.07		
10-Apr-85	2250	7.20	5	1780	360	1534	1.32	0.36	0.22	7.650		14	28.0		87	1.80	187	304					1.76		<.05		
17-Jul-85	1800	7.29	12	2440	383	2046	N.D.	0.09	0.02	0.010		<.05	3.1		100	8.00	212	459					3.30		0.11		
29-Oct-85	1900	7.25	15	2855	480	2319	1.50	1.40	0.40	0.010		15	4.8		117	8.20	230	510					0.10		0.05		

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 25-IV

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80	5100	7.10	76	3600		3400	0.73		0.64	0.067			3	194	11.10	400	640			N.D.	N.D.	N.D.	0.40	<.1	1.20	<.1	<.1
BKGRN 2/80																				0.02	<.02	<.05	5.80	1.30	2.10	0.07	0.75
27-Oct-80	6000	7.00	98																								
28-Nov-80	6000	7.00	121																								
23-Dec-80	7000	7.30	106																								
05-Feb-81	6000	7.10	91																								
02-Mar-81	3500	6.90	135																								
25-Mar-81	5000	7.50	98																								
29-Apr-81	4500	7.10	121																								
22-May-81	5000	7.00	91																								
25-Jun-81	4000	7.00	122																								
29-Jul-81	5000	7.00	99																								
07-Aug-81	4000	7.10	106																								
29-Sep-81	5500	7.10	76																								
15-Oct-81																											
25-Mar-82	3300	7.00	83																								
26-May-82	4500	6.80	8																								
22-Jun-82	3500	7.10	6																								
30-Jul-82	4400	6.50	66																								
25-Aug-82																											
19-Oct-82	4300	6.70	1	3115		2640	10.13		0.06			59									0.10	0.11	3.60			0.02	0.03
28-Jan-83	4500	6.80	55	3760		3150	2.68		<.01			30									0.20	0.06	1.51			<.05	0.02
26-Apr-83	4400	6.65	78	3460		2700	1.76		0.02		4.90	10									<.1	0.06	2.02			<.05	0.09
28-Jul-83	4850	6.60	21	3570		3050	8.56		0.01	0.041	22.00	52									0.05		2.72				0.01
31-Oct-83	4100	6.80	135	3410		2760	6.12		0.30	0.357	24.00	40									<.01	<.05	0.20				0.01
24-Apr-84	3800	6.80	64	3380		2718	3.12		1.20	0.006	5.00										N.D.	N.D.	4.20			N.D.	N.D.
17-Jul-84																											
15-Oct-84	3450	6.90	66	1892	596	2285	10.50	6.32	0.15	0.027		62	3.7	144	15.00	310	448						0.15		<.1		
25-Feb-85	DESTROYED																										
10-Apr-85																											
17-Jul-85																											
29-Oct-85																											

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE BOREHOLE 26-1

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80																											
BKGRN 2/80																											
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81																											
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	2615	7.6		180	1740		1650	2.24		0.01	0.010	8.20	353							N.D.	N.D.	0.14		N.D.	0.17		
24-Apr-84	2100	7.00		183	1760		1531	3.60		N.D.	0.010	31.00	132							N.D.	N.D.	1.49		N.D.	N.D.		
17-Jul-84																											
15-Oct-84	3140	6.95		141	1972	154	1739	2.20	1.80		N.D.		116	10.9	270	18.50	40	1.0				0.05		0.1			
25-Feb-85																											
10-Apr-85																											
17-Jul-85																											
29-Oct-85	1650	6.60		163	1580	115	1705	1.49	0.76	0.10	0.010		59	7.0	222	8.20	303	220				0.10		0.09			

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

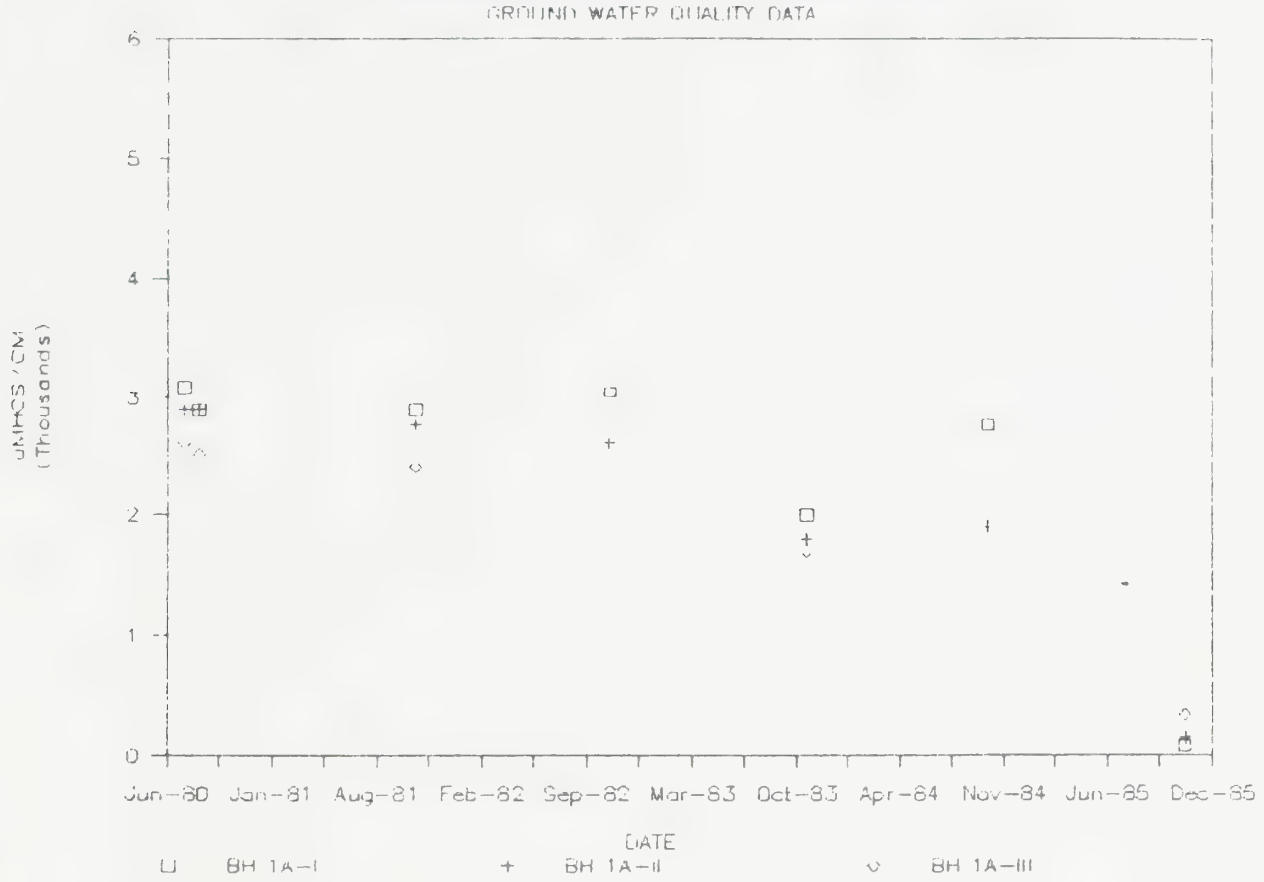
DATE BOREHOLE 26-II

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80																											
BKGRN 2/80																											
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
05-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81																											
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83	2375	7.00	176	1450		1250	1.25		0.01	0.008	6.80	29											N.D.	N.D.	0.12		N.D.	N.D.
24-Apr-84	2400	6.90	188	1700		1281	1.60		N.D.	0.006	2.00	19											N.D.	N.D.	1.30		N.D.	N.D.
17-Jul-84																											
15-Oct-84	2600	6.90	200	1668	180	1159	7.50	1.30		1.000		91	10.9		159	12.50	360	190					0.19				
25-Feb-85	2000	7.30	6	1890	180	1570	1.20	1.20	0.10	N.D.		14	7.8		66	3.60	311	225					0.98				
10-Apr-85	2670	7.00	209	1880	200	1671	2.08	1.15	0.15	0.050		12	11		172	4.00	310	229					1.76				
17-Jul-85	1800	7.21	197	1668	188	1296	0.05	0.02	0.01	0.080		5	5.6		171	5.00	314	217					2.80	0.72			
29-Oct-85	1650	6.95	195	1705	205	1534	1.60	1.02	0.17	0.010		29	2.1		190	4.10	324	230					0.30	0.55			

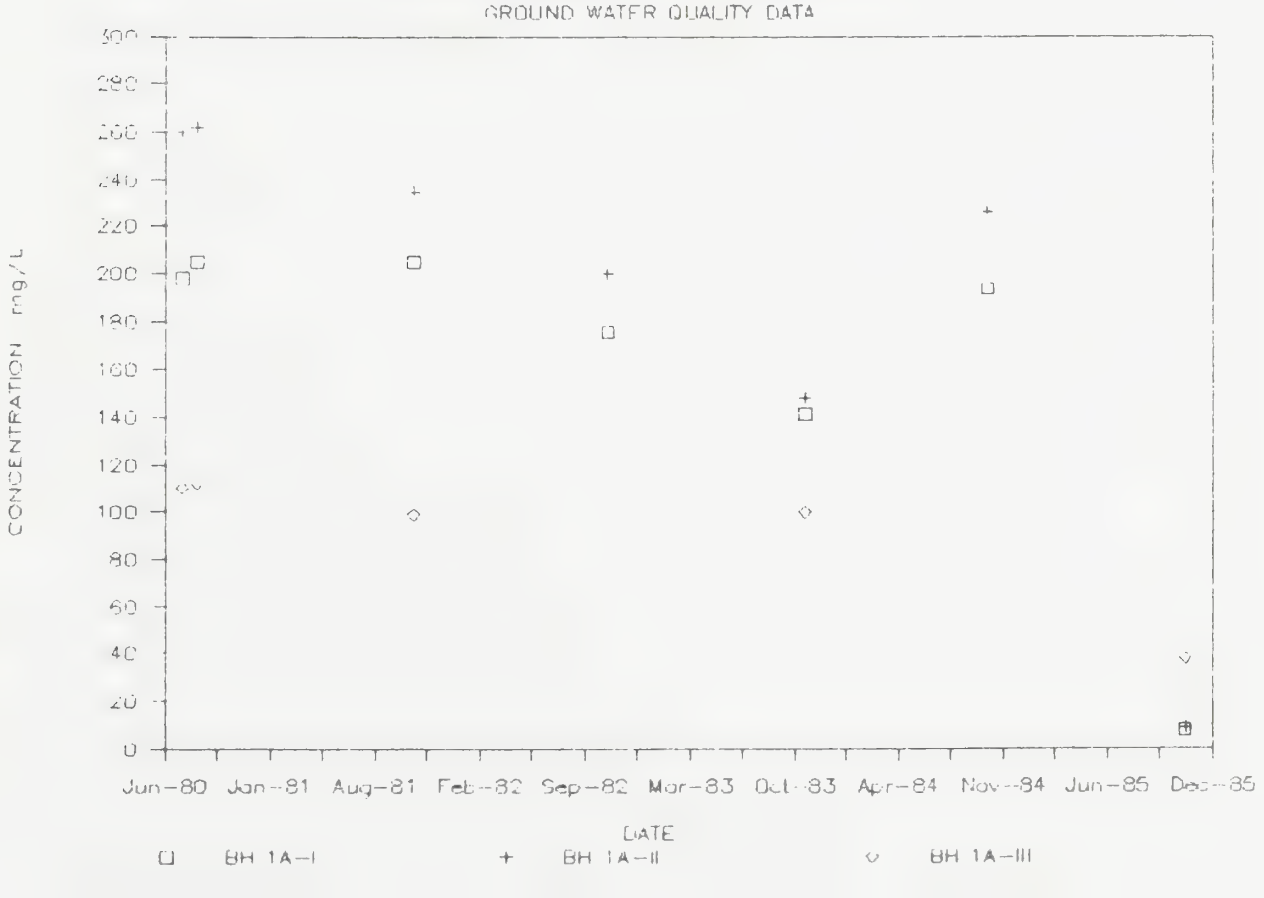
GLANBROOK LANDFILL SITE
PROJECT NO 86-35
GROUND WATER QUALITY DATA

DATE	BOREHOLE 26-III																							
	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	ALKALINITY	SULPHATE	KJELDAHL AS N	AMMONIA	NITRATE	PHENOL ug/L	BOD	COD	DOC	TOC	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
BKGRN 1/80																											
BKGRN 2/80																											
27-Oct-80																											
28-Nov-80																											
23-Dec-80																											
5-Feb-81																											
02-Mar-81																											
25-Mar-81																											
29-Apr-81																											
22-May-81																											
25-Jun-81																											
29-Jul-81																											
07-Aug-81																											
29-Sep-81																											
15-Oct-81																											
25-Mar-82																											
26-May-82																											
22-Jun-82																											
30-Jul-82																											
25-Aug-82																											
19-Oct-82																											
28-Jan-83																											
26-Apr-83																											
28-Jul-83																											
31-Oct-83																											
24-Apr-84	2100	7.00	33	1800		1625	N.D.	3.10	0.012	2.00	15												N.D.	N.D.	N.D.	N.D.	N.D.
17-Jul-84	275	7.00	15	1760	370	1550	0.30	3.47	0.015		8	3.9		155	N.D.	210	255										
15-Oct-84	DRY																										
25-Feb-85	DRY																										
10-Apr-85	DRY																										
17-Jul-85																											
29-Oct-85	DRY																										

CONDUCTIVITY FIGURE 15

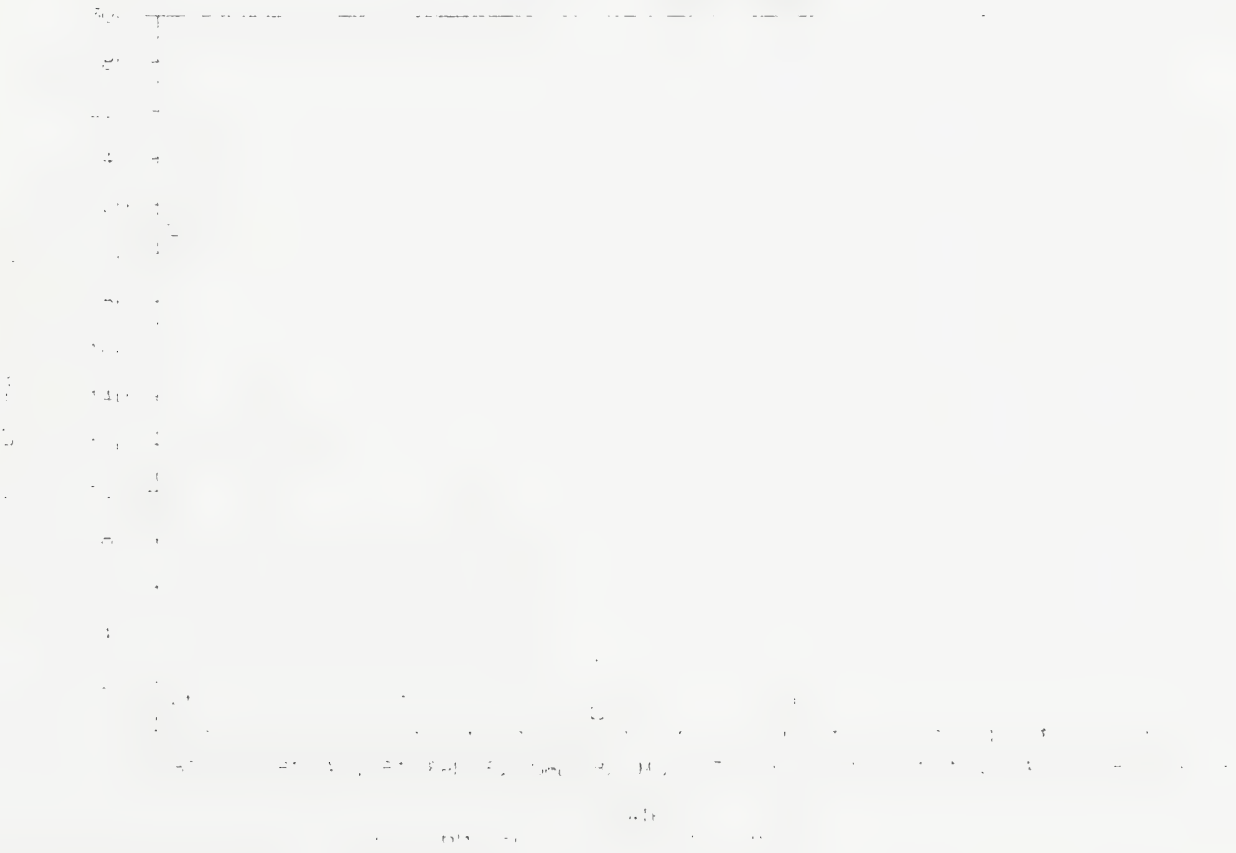


CHLORIDE FIGURE 16

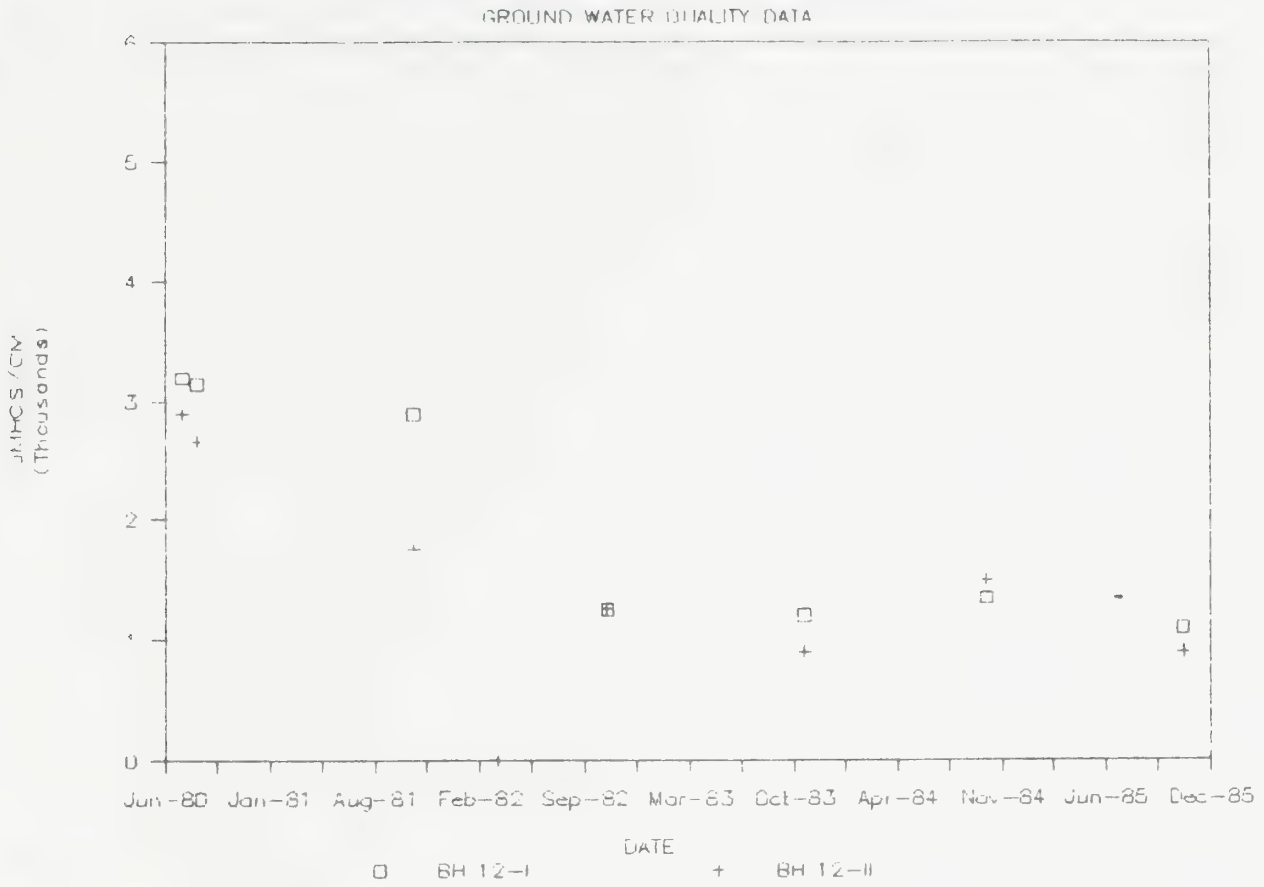


CONDUCTIVITY FIGURE 17

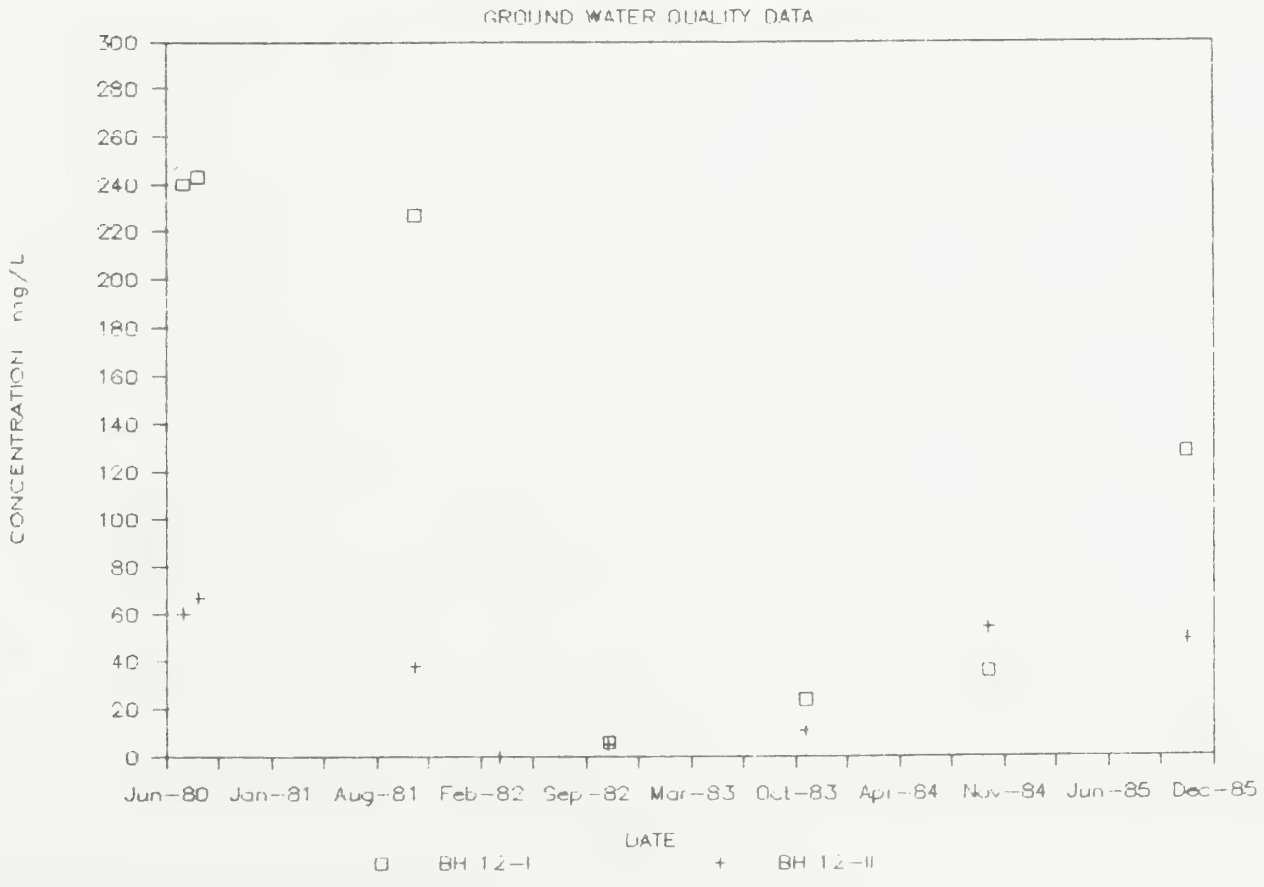
CHLORIDE FIGURE 18



CONDUCTIVITY FIGURE 19



CHLORIDE FIGURE 20

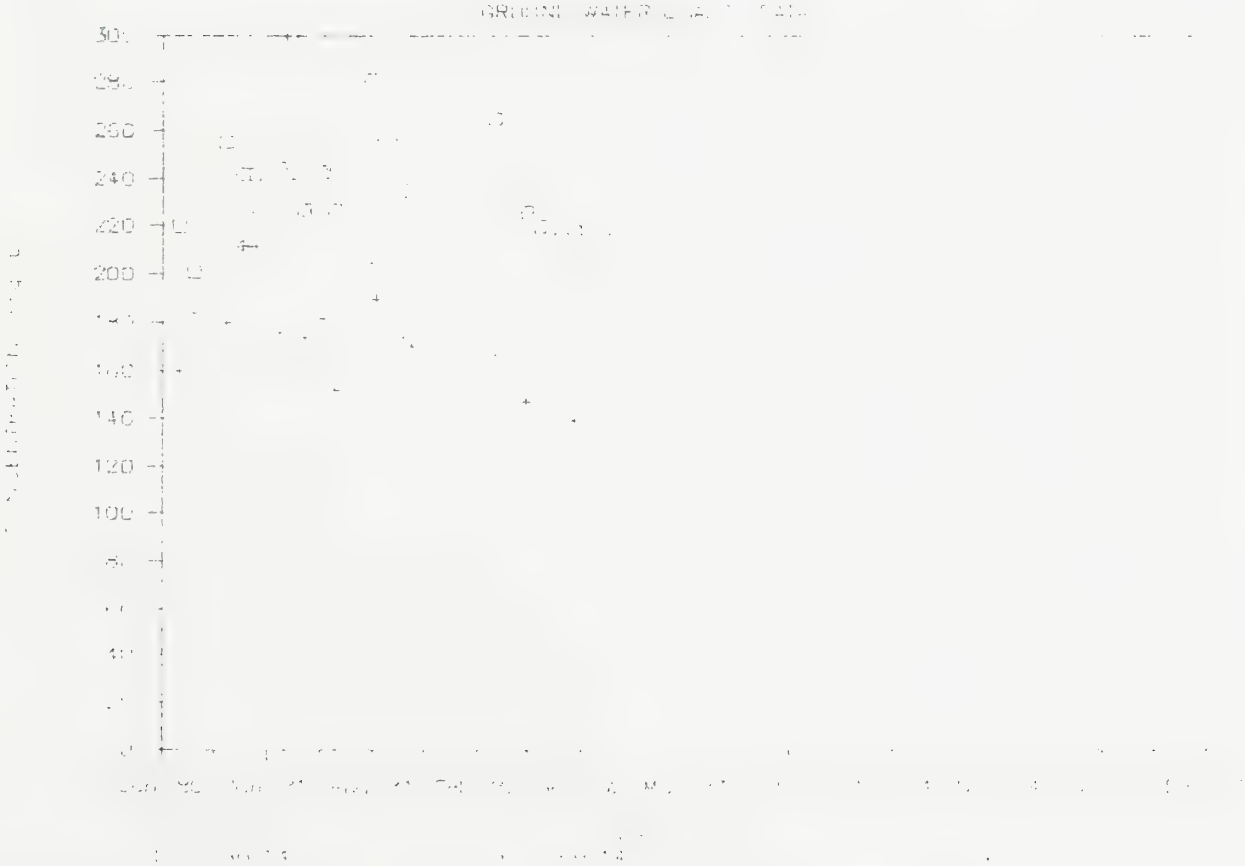


CONDUCTIVITY FIGURE 21

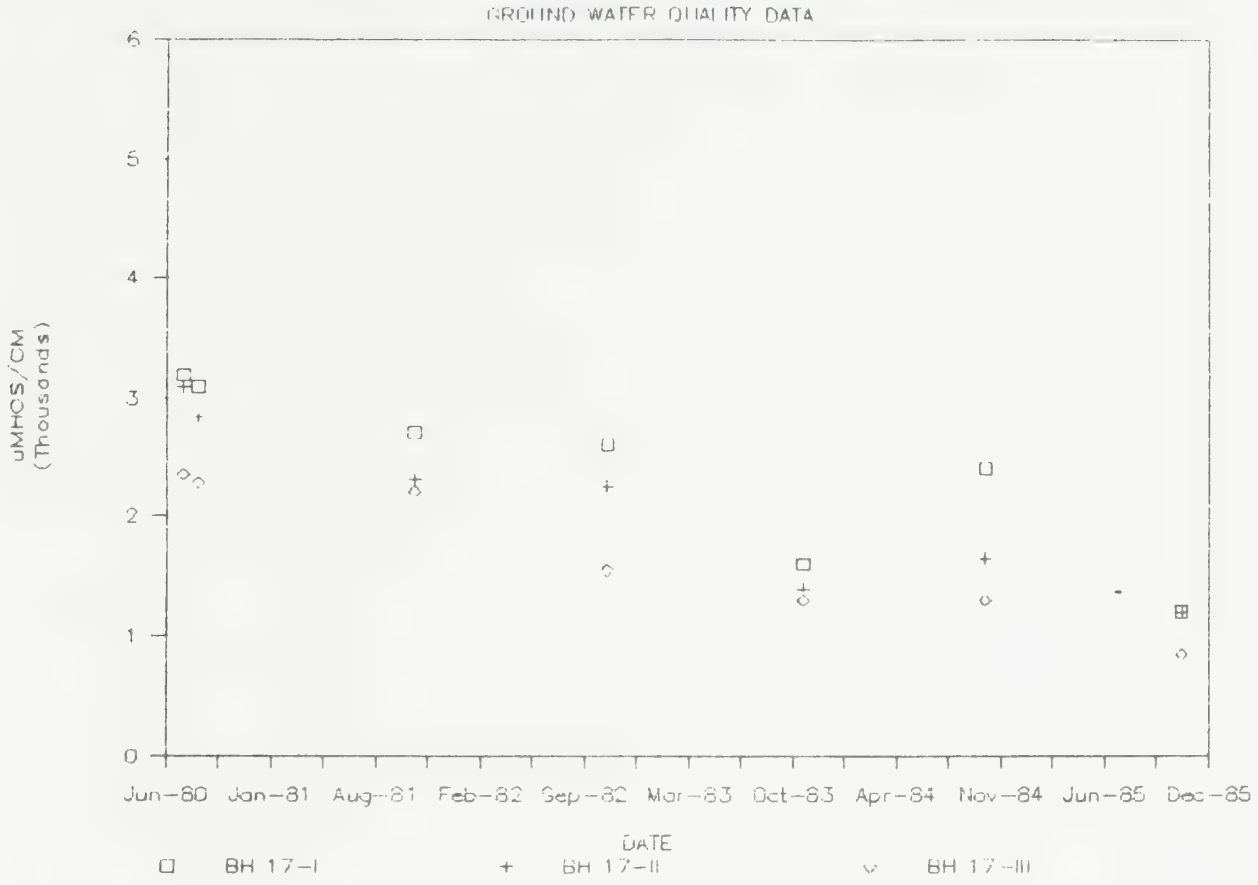
CHLORIDE FIGURE 22

CONDUCTIVITY FIGURE 23

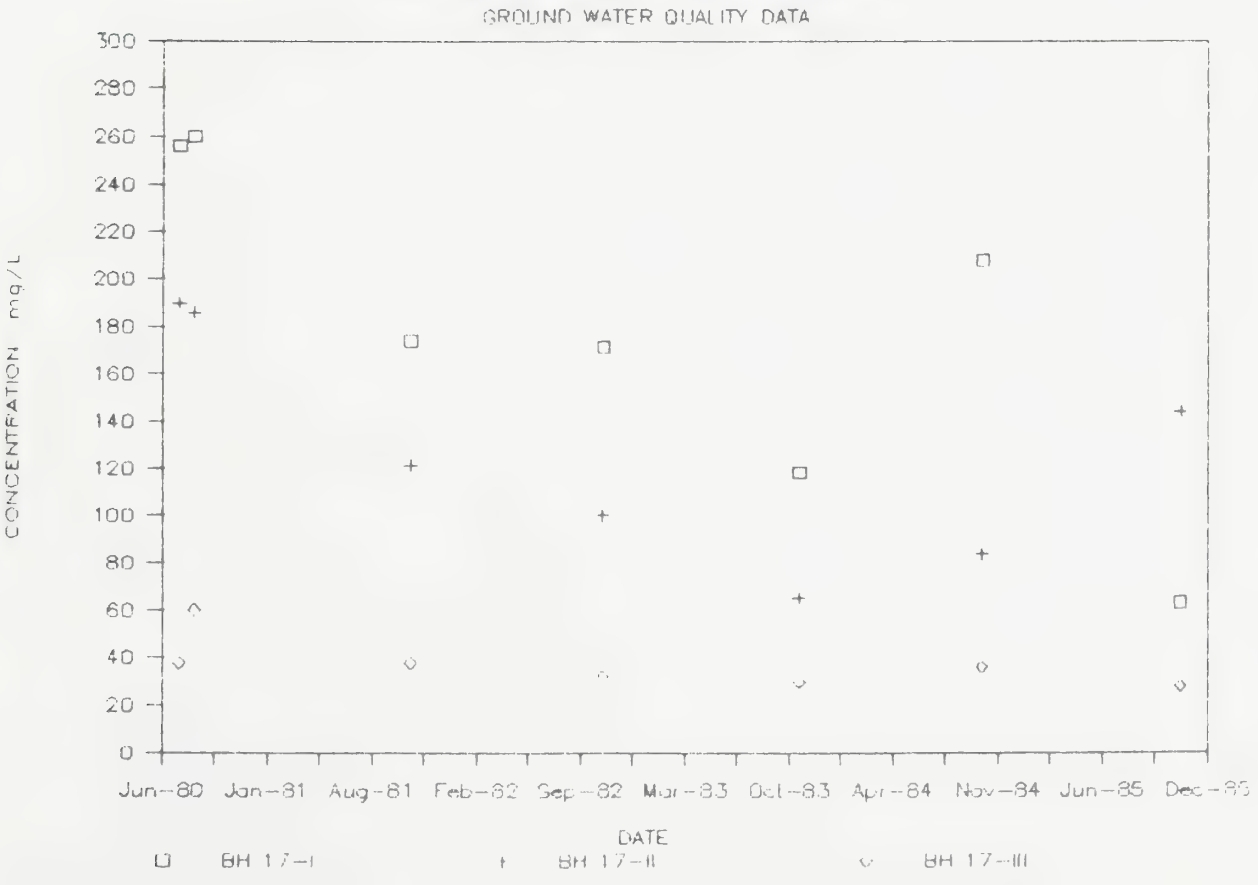
CHLORIDE FIGURE 24



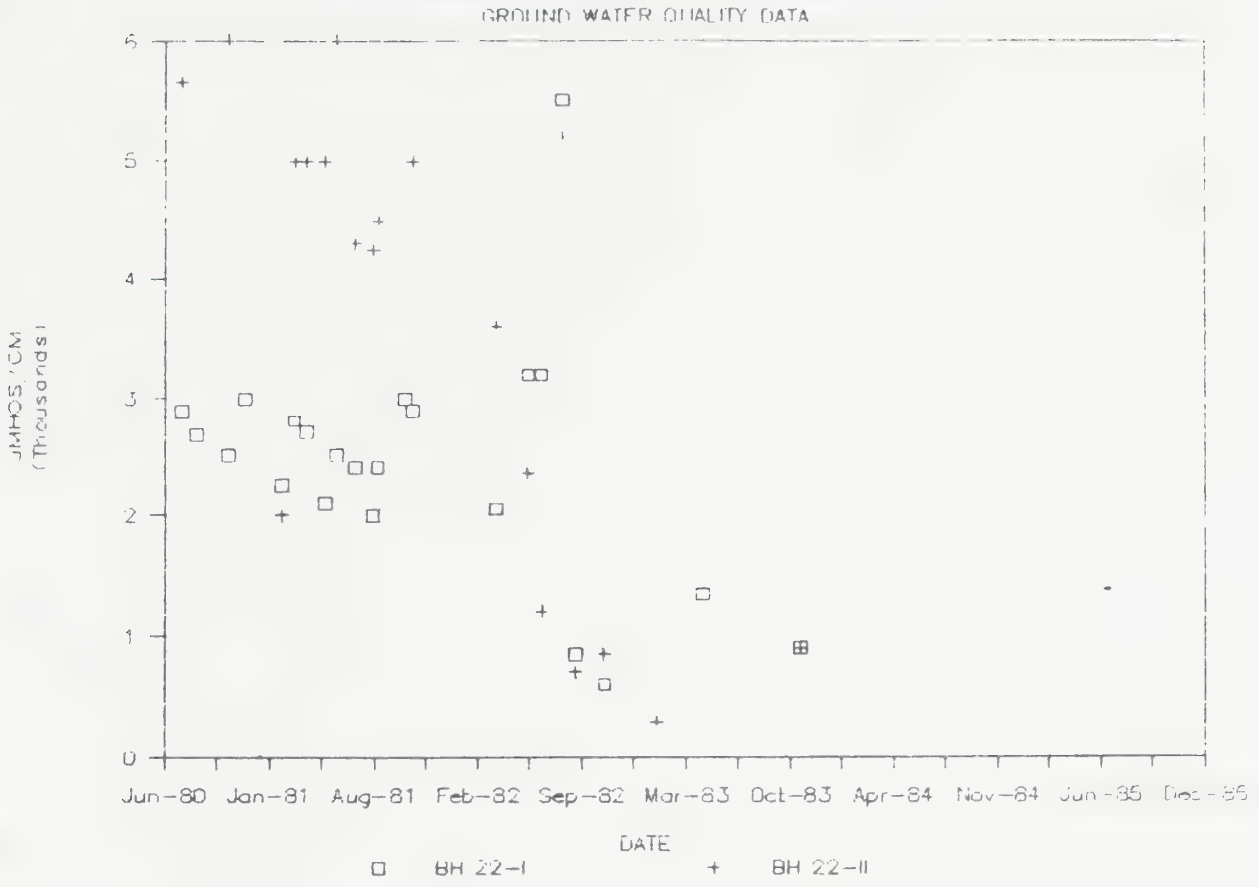
CONDUCTIVITY FIGURE 25



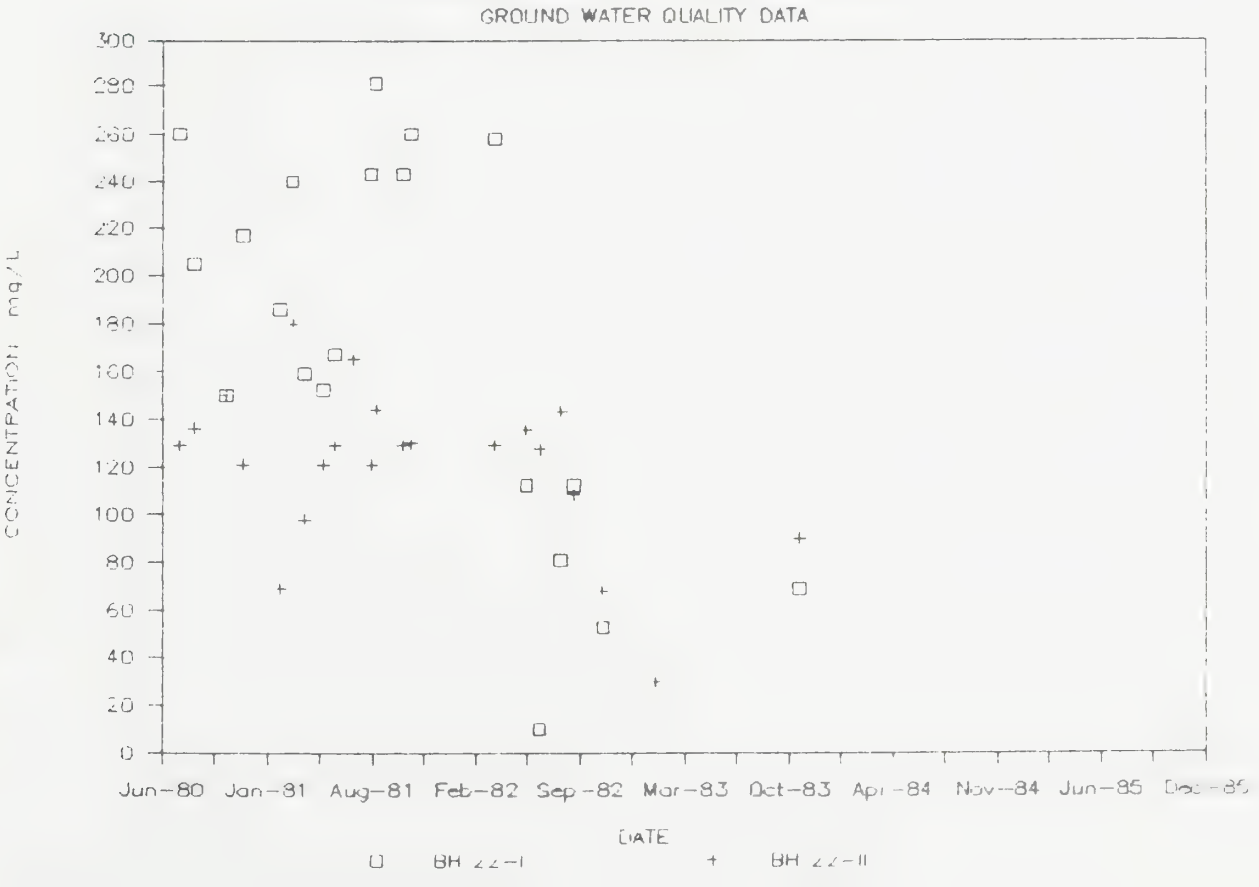
CHLORIDE FIGURE 26



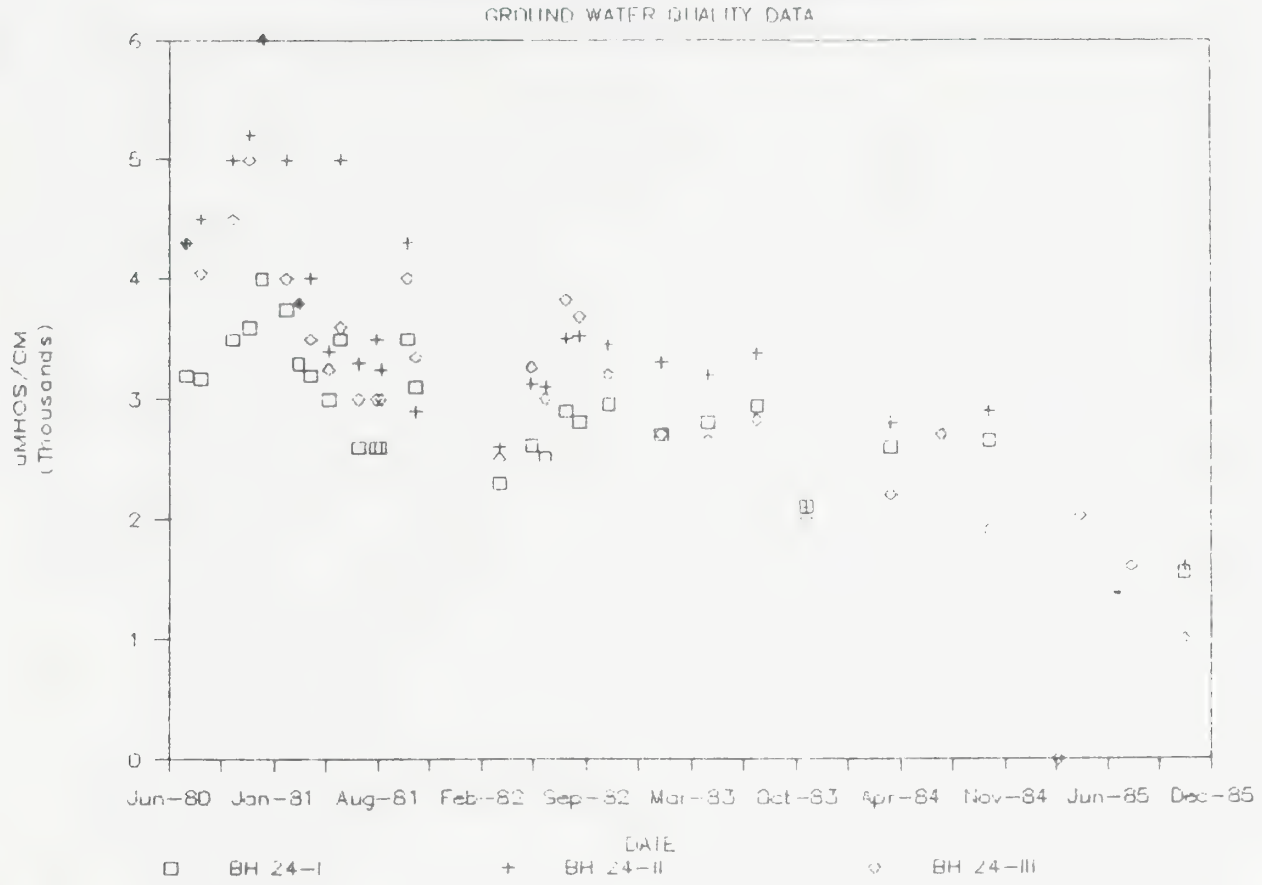
CONDUCTIVITY FIGURE 27



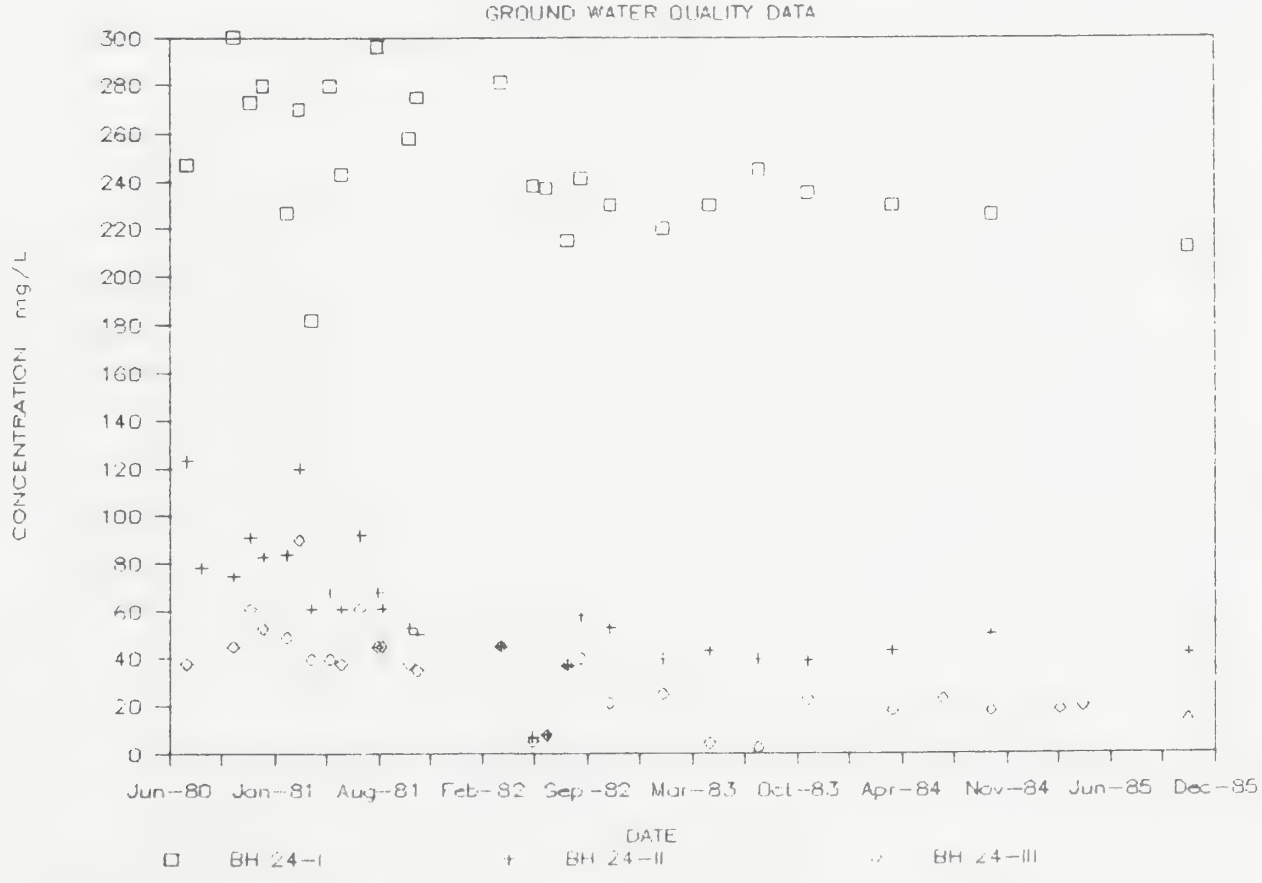
CHLORIDE FIGURE 28



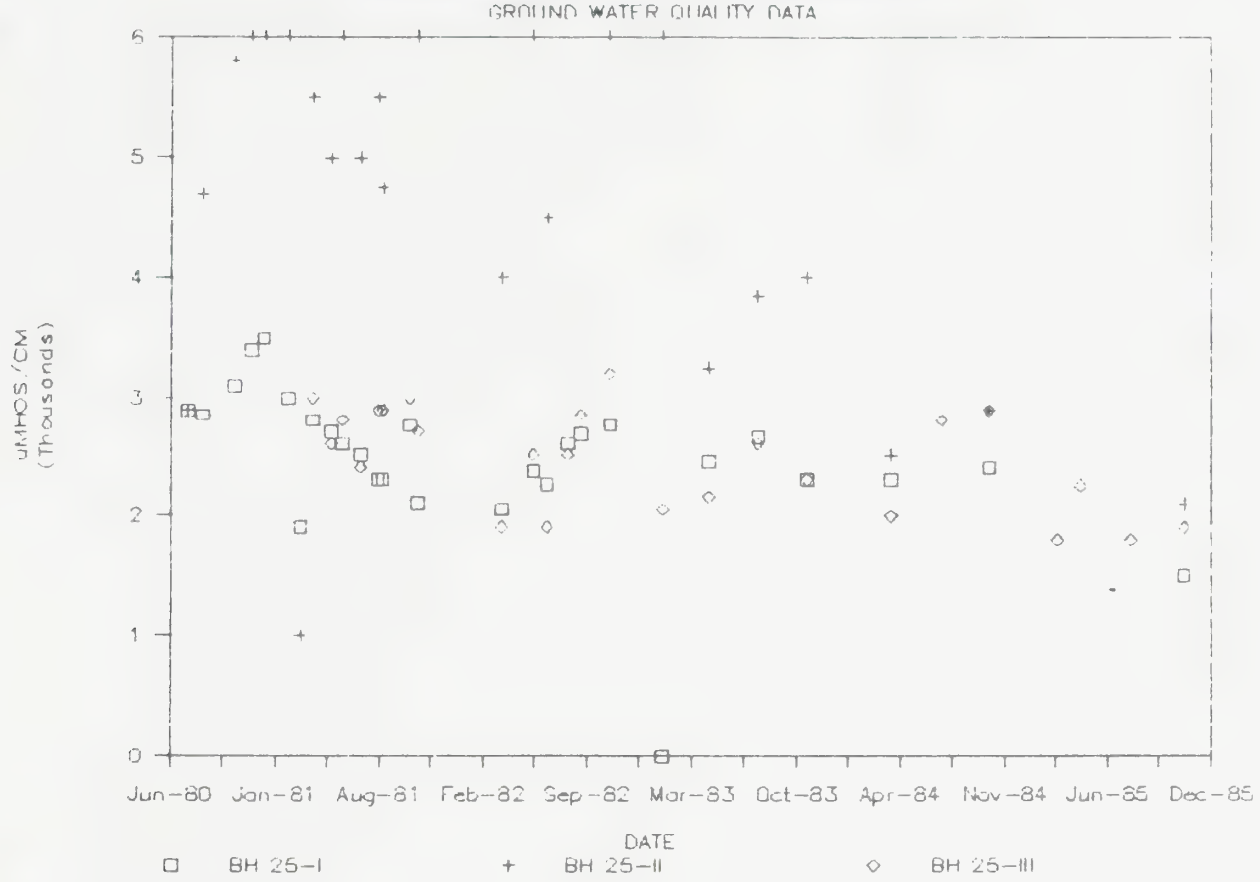
CONDUCTIVITY FIGURE 29



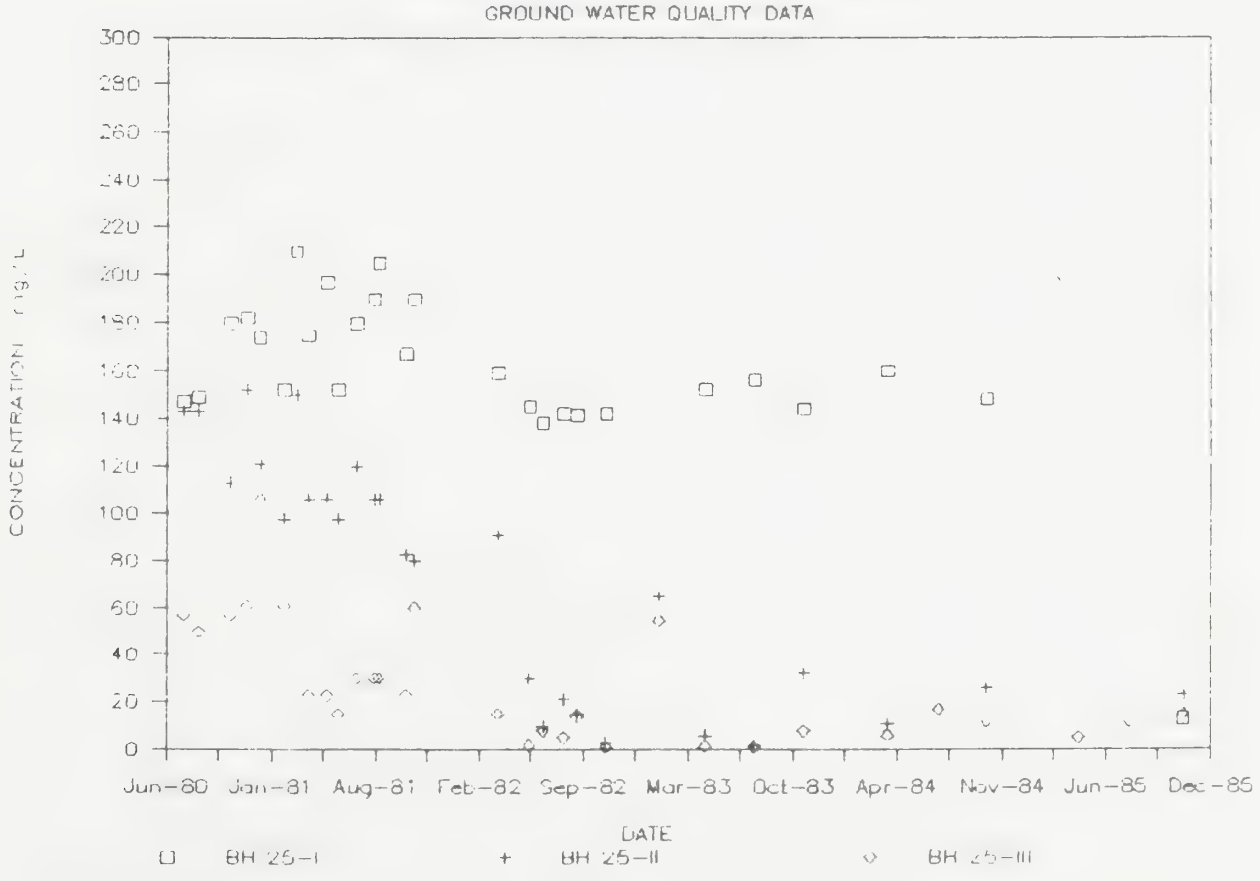
CHLORIDE FIGURE 30



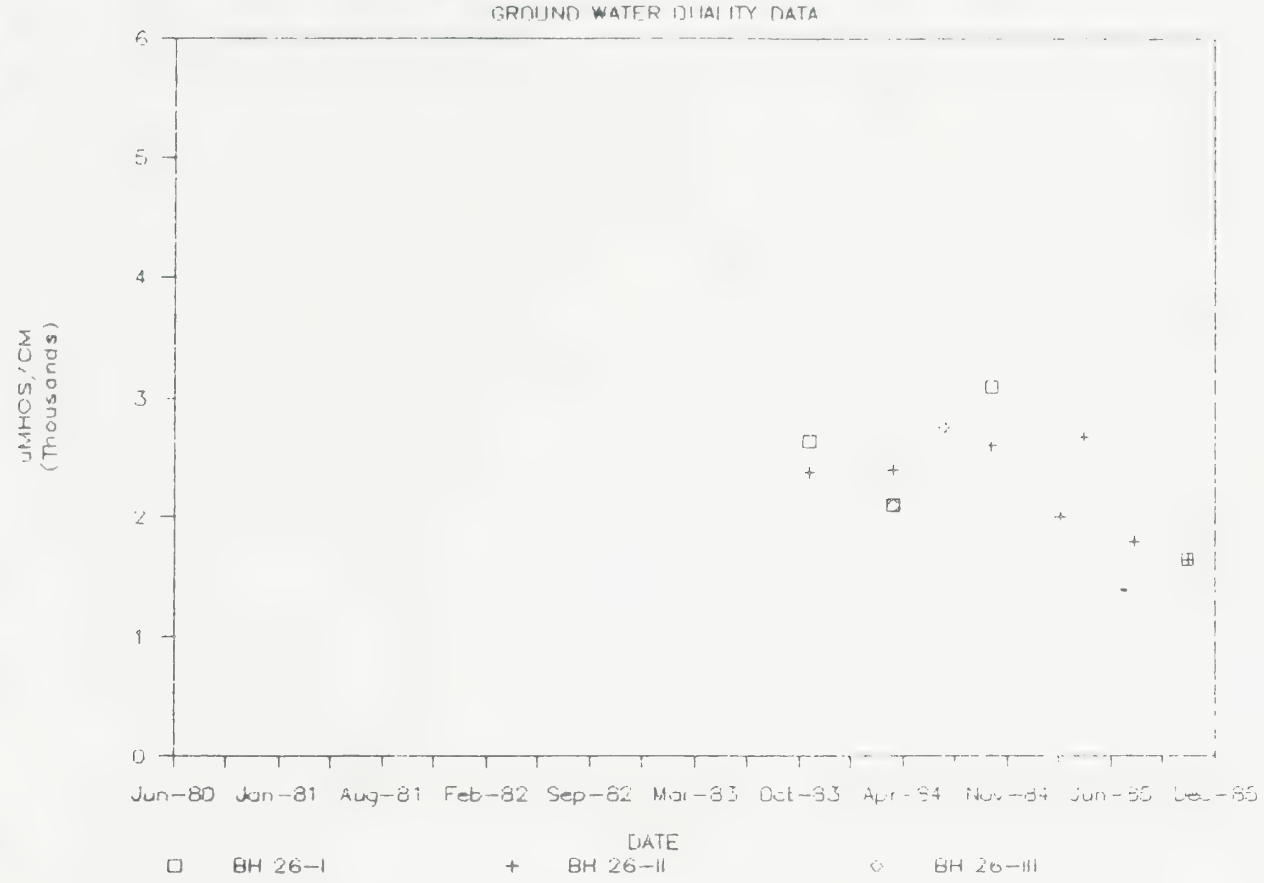
CONDUCTIVITY FIGURE 31



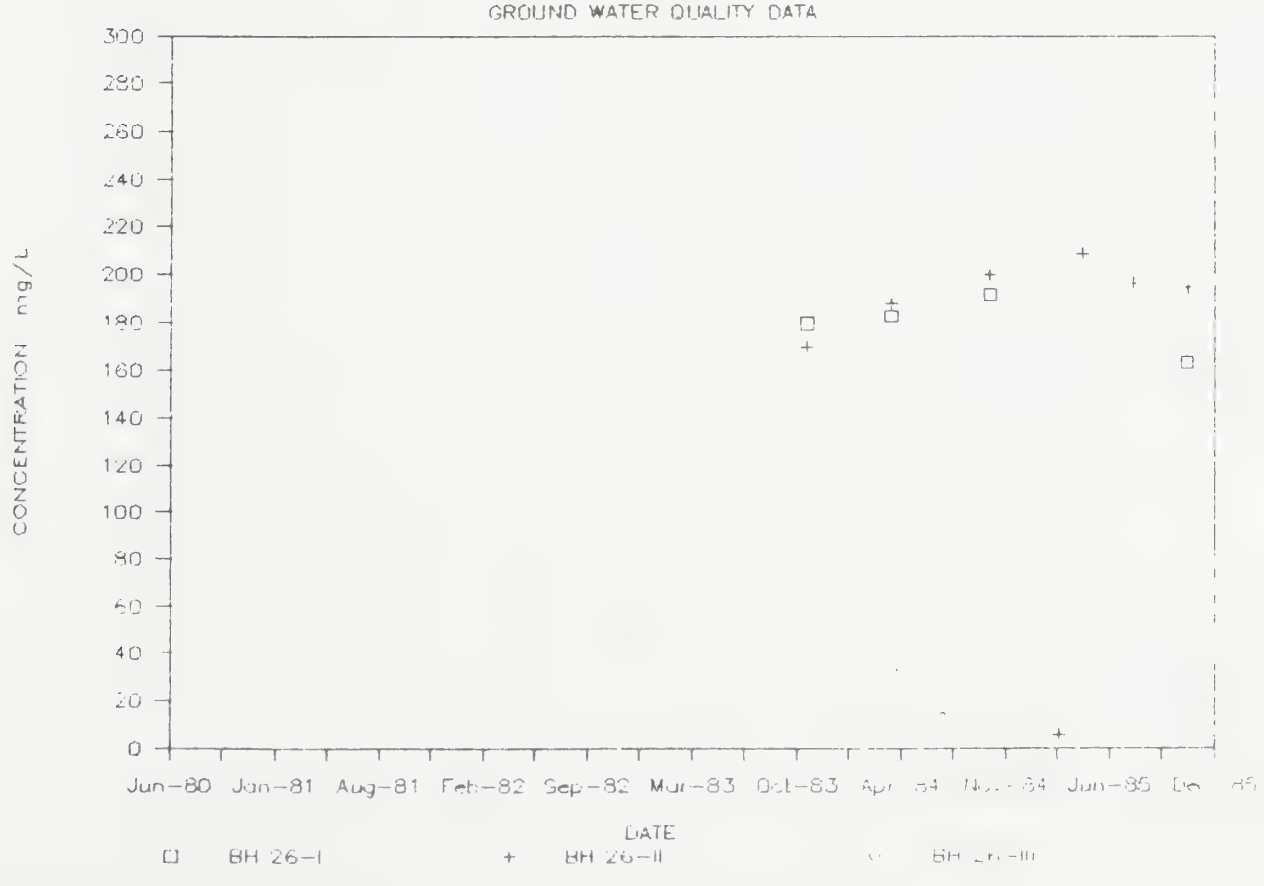
CHLORIDE FIGURE 32



CONDUCTIVITY FIGURE 33



CHLORIDE FIGURE 34



APPENDIX D

LEACHATE QUALITY DATA

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
LEACHATE QUALITY DATA

DATE	MANHOLE 1																				
	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	SULPHATE	KJELDAHL AS N	NITRATE	PHENOL ug/L	BOD	COD	TOC	SODIUM	POTASSIUM	CALCUIM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81	2600	6.80	99.00																					
22-May-81	2250	7.20	45.00																					
25-Jun-81	1900	7.00	45.00																					
29-Jul-81																								
27-Aug-81																								
29-Sep-81	4000	7.10	61.00																					
25-Mar-82	230	7.50	8.00																					
19-Oct-82	2900	7.60	0.70	23	1400	4.32				29								0.04	0.02	3.40			0.04	0.52
31-Oct-82																								
28-Jan-83	1800	6.90	37.50																					
26-Apr-83	4900	7.00	310.00																					
28-Jul-83	6000	6.90	285.00																					
31-Oct-83	800	6.90	900.00																					
17-Jul-84	6500	6.50	500.00																					
23-Oct-84	5000	7.20	32.00																					
25-Feb-85	7000	6.40	750.00																					
10-Apr-85	4725	7.30	740.00																					
17-Jul-85	3400	7.30	695.00																					
29-Oct-85	3150	7.40	120.00																					

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
LEACHATE QUALITY DATA

MANHOLE 2

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	SULPHATE	KJELDAHL AS N	NITRATE	PHENOL ug/L	BOD	COD	TOC	SODIUM	POTASSIUM	CALCUIM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81																								
22-May-81																								
25-Jun-81																								
29-Jul-81																								
27-Aug-81																								
29-Sep-81																								
25-Mar-82																								
19-Oct-82	2900	7.50	0.70	2093	1540	4.32	0.01			44								N.D.		0.01	1.79			0.02	0.30
31-Oct-82																								
28-Jan-83																								
26-Apr-83																								
28-Jul-83																								
31-Oct-83	6000	6.95	225.00																					
17-Jul-84																								
23-Oct-84																								
25-Feb-85																								
10-Apr-85																								
17-Jul-85																								
29-Oct-85																								

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
LEACHATE QUALITY DATA

DATE MANHOLE 3

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	SULPHATE	KJELDAHL AS N	NITRATE	PHENOL ug/L	BOD	COD	TOC	SODIUM	POTASSIUM	CALCUIM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81	2050	7.00	53.00																					
22-May-81	2500	7.10	38.00																					
25-Jun-81	2500	7.00	91.00																					
29-Jul-81	2600	7.40	61.00																					
27-Aug-81	2700	7.80	53.00																					
29-Sep-81	3000	7.60	53.00																					
25-Mar-82	1200	8.00	23.00																					
19-Oct-82	3300	7.50	0.50	2335	1720	8.32	0.01			22								N.D.	N.D.	0.65			0.03	0.02
31-Oct-82																								
28-Jan-83																								
26-Apr-83																								
28-Jul-83																								
31-Oct-83	2000	6.80	43.00																					
24-Apr-84																								
17-Jul-84																								
23-Oct-84																								
25-Feb-85																								
10-Apr-85																								
17-Jul-85																								
29-Oct-85																								

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
LEACHATE QUALITY DATA

DATE MANHOLE 4

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	SULPHATE	KJELDAHL AS N	NITRATE	PHENOL ug/L	BOD	COD	TOC	SODIUM	POTASSIUM	CALCUIM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81	1850	7.20	40.00																					
22-May-81	2100	7.10	53.00																					
25-Jun-81	2900	7.00	91.00																					
29-Jul-81	2500	7.20	61.00																					
27-Aug-81	2600	7.50	68.00																					
29-Sep-81	3000	7.30	45.00																					
25-Mar-82	2700	7.30	83.00																					
19-Oct-82	3550	7.40	0.50	2580	1650	10.12				59								N.D.		1.10			0.02	0.01
31-Oct-82	2100	6.80	60.00																					
28-Jan-83																								
26-Apr-83	3350	6.90	110.00																					
28-Jul-83	4000	6.70	100.00																					
31-Oct-83	3900	5.50	275.00																					
24-Apr-84	8000	6.90	100.00																					
17-Jul-84	2400	6.30	145.00																					
23-Oct-84	1600	6.80	29.00																					
25-Feb-85	1100	6.10	80.00																					
10-Apr-85	1275	6.60	47.00																					
17-Jul-85	1100	7.40	75.00																					
29-Oct-85	1600	6.70	238.00																					

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
LEACHATE QUALITY DATA

DATE	MANHOLE 5																						
	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	SULPHATE	KJELDAHL AS N	NITRATE	PHENOL ug/L	BOD	COD	TOC	SODIUM	POTASSIUM	CALCUIM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81																							
22-May-81																							
25-Jun-81																							
29-Jul-81																							
27-Aug-81																							
29-Sep-81																							
25-Mar-82																							
19-Oct-82																							
31-Oct-82																							
28-Jan-83																							
26-Apr-83	2700	6.90	57.00																				
28-Jul-83																							
31-Oct-83																							
17-Jul-84																							
23-Oct-84																							
25-Feb-85																							
10-Apr-85																							
17-Jul-85																							
29-Oct-85																							

GLAMBROOK LANDFILL SITE
PROJECT NO 86-35
LEACHATE QUALITY DATA

DATE MANHOLE 6

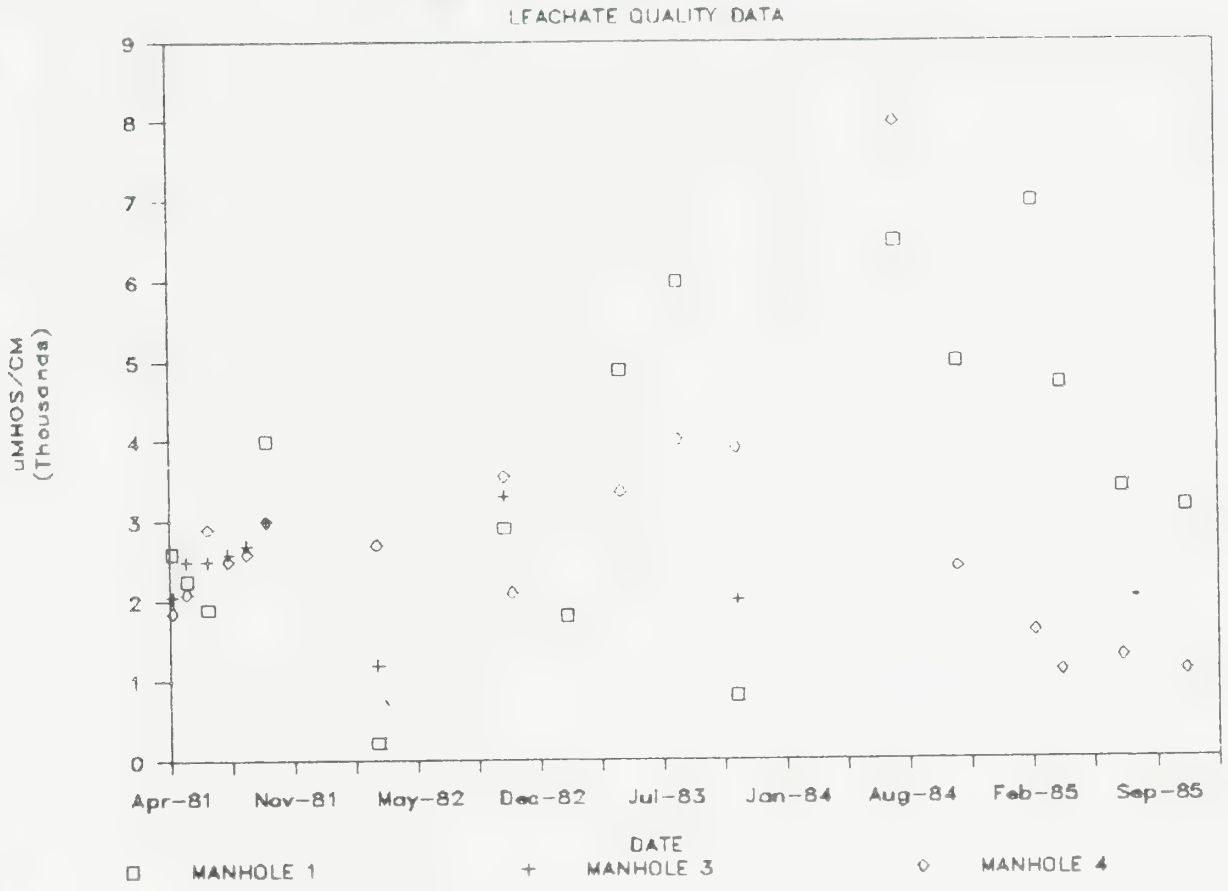
	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	SULPHATE	KJELDAHL AS N	NITRATE	PHENOL ug/L	BOD	COD	TOC	SODIUM	POTASSIUM	CALCUIM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81																								
22-May-81																								
25-Jun-81																								
29-Jul-81																								
27-Aug-81																								
29-Sep-81																								
25-Mar-82																								
19-Oct-82																								
31-Oct-82																								
28-Jan-83																								
26-Apr-83	2550	7.00		42.00																				
28-Jul-83																								
31-Oct-83																								
17-Jul-84																								
23-Oct-84																								
25-Feb-85																								
10-Apr-85																								
17-Jul-85																								
29-Oct-85																								

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
LEACHATE QUALITY DATA

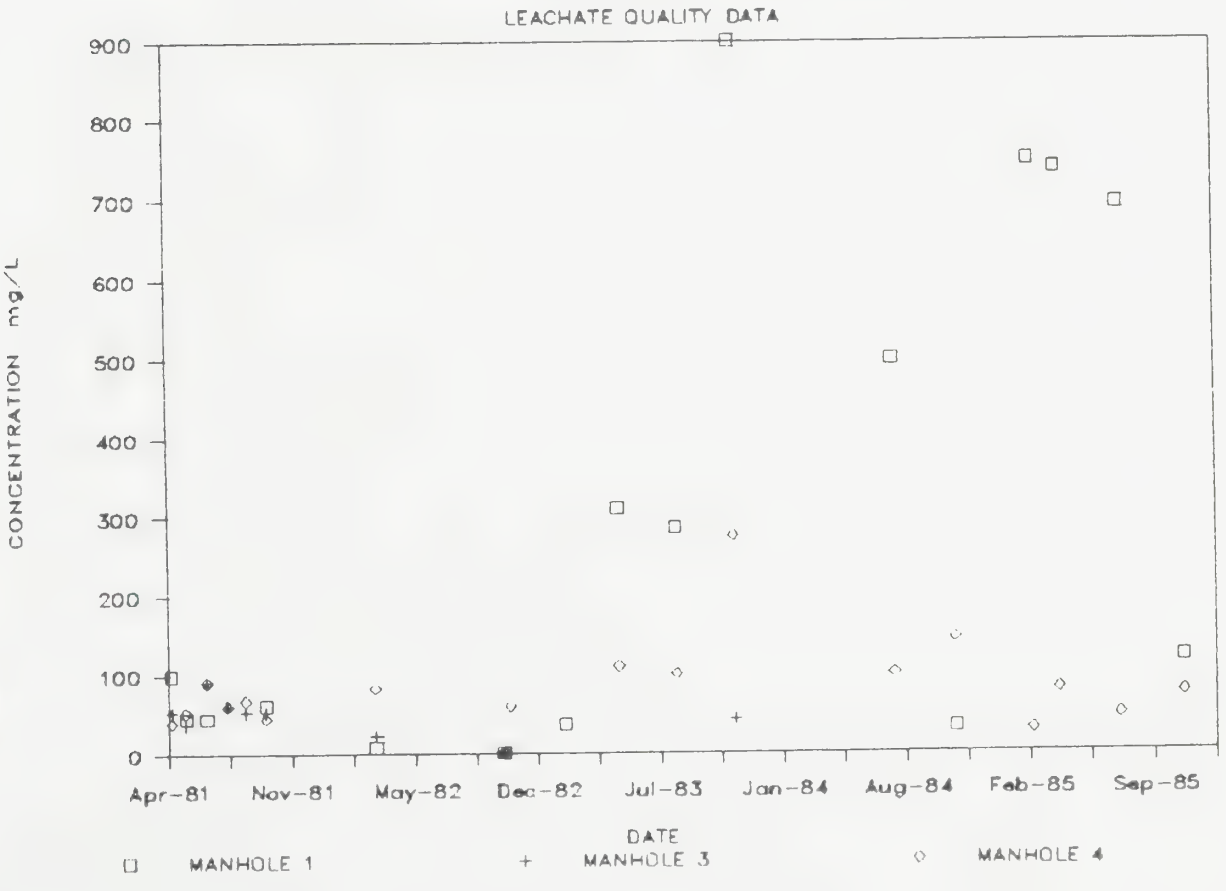
DATE MANHOLE 7

	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	SULPHATE	KJELDAHL AS N	NITRATE	PHENOL ug/L	BOD	COD	TOC	SODIUM	POTASSIUM	CALCUIM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC
29-Apr-81																								
22-May-81																								
25-Jun-81																								
29-Jul-81																								
27-Aug-81																								
29-Sep-81																								
25-Mar-82																								
19-Oct-82																								
31-Oct-82																								
28-Jan-83																								
26-Apr-83	2100	7.00		41.00																				
28-Jul-83																								
31-Oct-83																								
17-Jul-84																								
23-Oct-84																								
25-Feb-85																								
10-Apr-85																								
17-Jul-85																								
29-Oct-85																								

CONDUCTIVITY FIGURE 35



CHLORIDE FIGURE 36



APPENDIX E

SURFACE WATER QUALITY DATA

TABLE 5 SHEET 1

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
BUCKHORN CREEK - SURFACE WATER DATA

SW 1

DATE	CONDUCT uMHOS/CM	pH	CHLORIDES	HARDNESS	SULPHATE	KJELDAHL AS N	NITRATE	PHENOL	BOD	COD	TIC	SODIUM	POTASSIUM	CALCUIM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC	DISSOLVED OXYGEN
19-Oct-82	1800	7.1	64.0																						10.8
28-Jan-83	1200	7.2	47.0																						10.2
31-Jan-83	420	6.5	35.0																						6.7
16-May-84	545	7.0	19.0																						
14-Nov-84	500	6.1	22.5																						13.4
29-Oct-85	390	7.3	48.0																						0.9

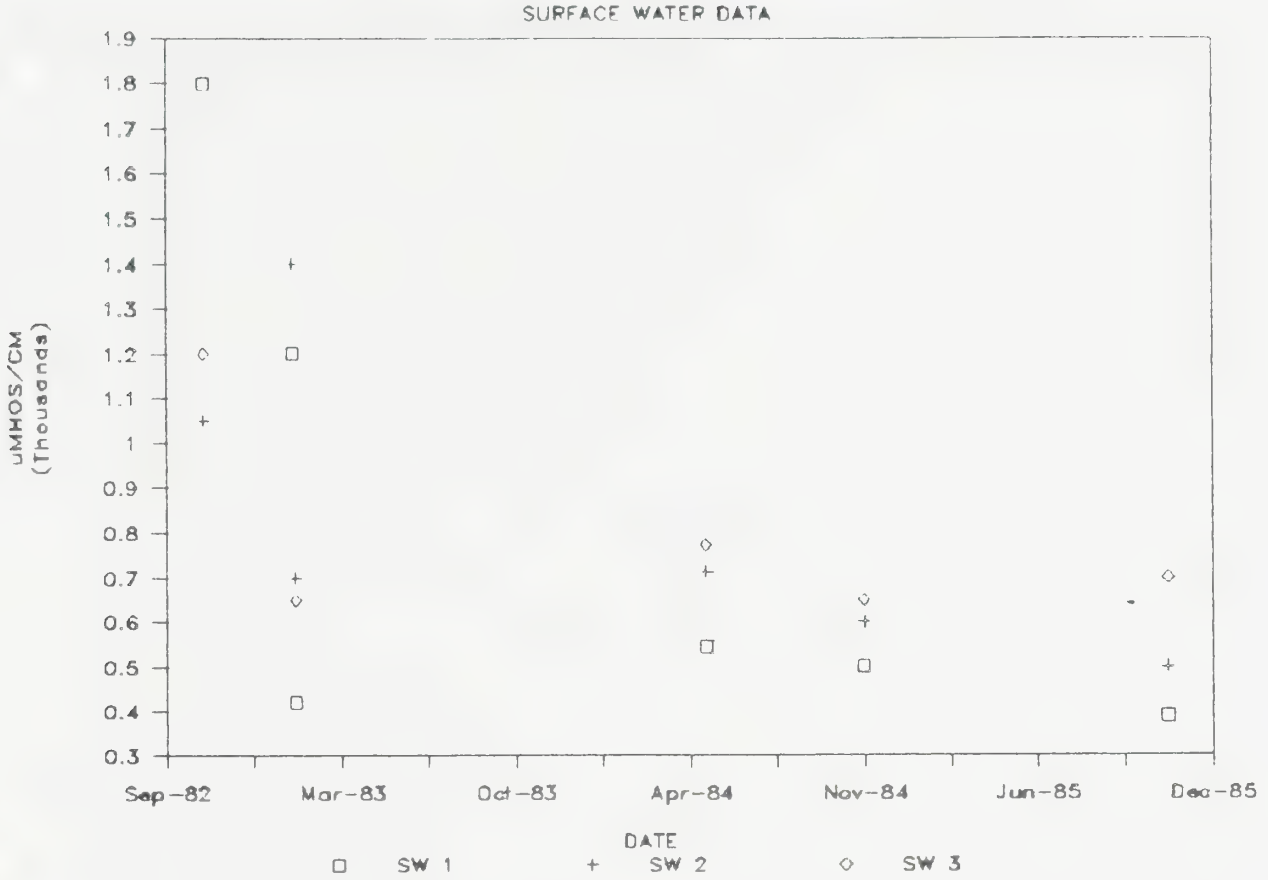
SW 2

DATE	CONDUCTIV uMHOS/CM	pH	CHLORIDES	HARDNESS	SULPHATE	KJELDAHL AS N	NITRATE	PHENOL	BOD	COD	TIC	SODIUM	POTASSIUM	CALCUIM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC	DISSOLVED OXYGEN
19-Oct-82	1050	6.9	168.0																						10.2
28-Jan-83	1400	7.0	74.0																						11.8
31-Jan-83	700	6.7	56.0																						10.2
16-May-84	713	7.1	37.0																						
14-Nov-84	600	6.3	27.5																						13.0
29-Oct-85	500	7.5	70.0																						4.0

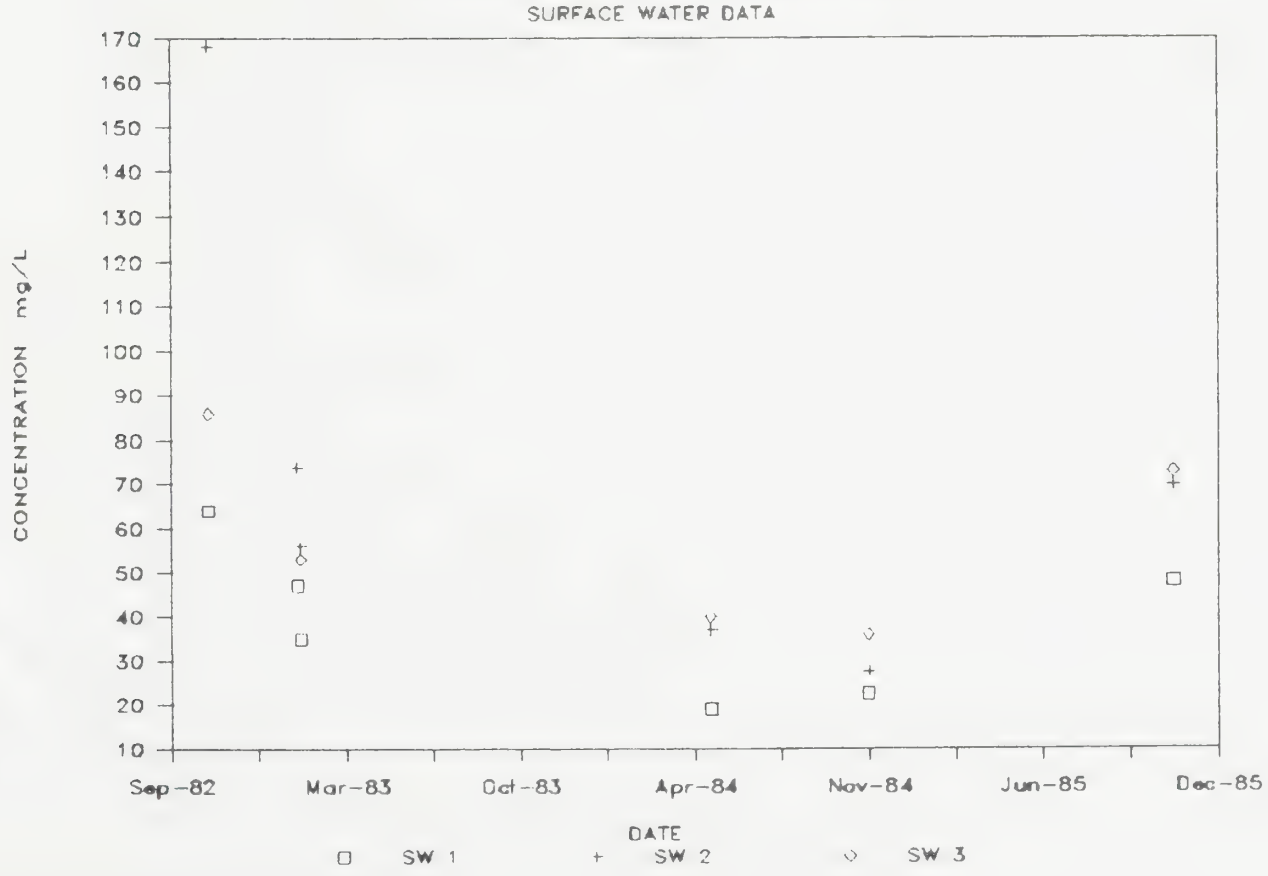
SW 3

DATE	CONDUCTIV uMHOS/CM	pH	CHLORIDES	HARDNESS	SULPHATE	KJELDAHL AS N	NITRATE	PHENOL	BOD	COD	TIC	SODIUM	POTASSIUM	CALCUIM	MAGNESIUM	PHOSPHORUS AS P	CADMIUM	CHROMIUM	COPPER	IRON	LEAD	MANGANESE	NICKEL	ZINC	DISSOLVED OXYGEN
19-Oct-82	1200	6.9	86.0																						9.2
28-Jan-83	NO SAMPLE																								
31-Jan-83	650	7.3	53.0																						11.3
16-May-84	772	7.3	40.0																						
14-Nov-84	650	6.4	36.0																						13.4
29-Oct-85	700	7.6	73.0																						11.7

CONDUCTIVITY FIGURE 37



CHLORIDE FIGURE 38



APPENDIX F

METHANE GAS RESULTS

TABLE 6 SHEET 1

GLANBROOK LANDFILL SITE
PROJECT NO 86-35
METHANE GAS RESULTS

	GM 1	GM 2	GM 3	GM 4	GM 5
23-Dec-83	0.00	0.00	0.25	NA	0.00
31-Jan-84	0.25	0.20	0.20	0.25	0.00
02-Feb-84	0.25	0.20	0.20	0.25	0.00
27-Apr-84	0.25	0.25	0.25	0.25	0.00
17-Aug-84	0.90	0.00	0.00	0.00	0.00
27-Dec-84	0.00	0.00	0.00	0.00	0.00
23-Apr-85	0.00	0.00	0.00	0.00	0.00

NOTE: RESULTS IN % METHANE

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